September 13, 1943

TECHNOLOGY DEPT

STEEL

The Magazine of Metalworking and Metalproducing

ESTABLISHED 1882

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DETROIT

ARMY E NAVY

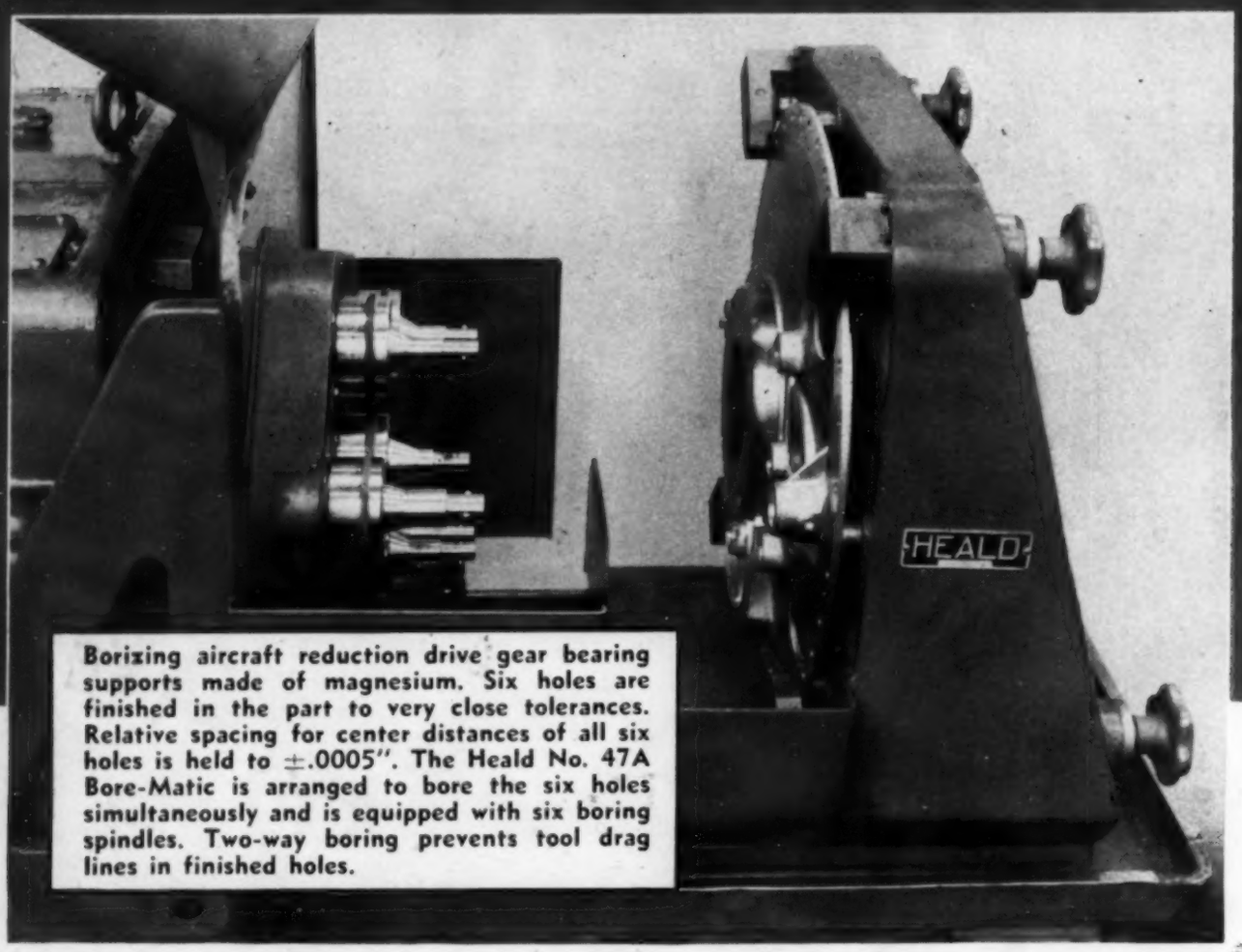
The Army-Navy "E" Flag with three stars, flies over the Mesta plant

Pouring Open Hearth Steel
From One of the Furnaces at Mesta

MESTA MACHINE COMPANY • PITTSBURGH, PA.

The Solution

TO MACHINING POST-WAR LIGHT-METALS . .



Borizing aircraft reduction drive gear bearing supports made of magnesium. Six holes are finished in the part to very close tolerances. Relative spacing for center distances of all six holes is held to ±.0005". The Heald No. 47A Bore-Matic is arranged to bore the six holes simultaneously and is equipped with six boring spindles. Two-way boring prevents tool drag lines in finished holes.

Today's precision *BORIZING* of Aircraft Parts

In aircraft plants, everywhere, Heald Bore-Matics are boring, turning, facing and grooving hundreds of light metal parts to precision tolerances . . . with a finish measured in micro-inches. The same Heald "know-how" that gave the aircraft industry precision finished at mass production speeds will give post-war manufacturers maximum precision and production in machining light metal alloys.

The same engineering organization that designed and developed means and methods for accomplishing the impossible on complicated war time products are available to you for today or tomorrow's problems. Make this department part of your organization.

Partial List of BORIZED Parts

- Bases
- Bearing Housings
- Camshaft Housings
- Covers
- Cylinder Heads
- Crankcase Sections
- Front Covers
- Gear Boxes
- Gun Turret Saddles
- Gyro Pilot Servo Bodies
- Instrument End Shields
- Magneto Housings
- Oil Pump Bodies
- Propeller Shaft Plugs
- Reduction Gear Cases
- Regulator Housings
- Speed Reducer Housings
- Supercharger Gear Casings
- Valve Housings
- Valve Tappet Guides

The Heald Machine Company Worcester, Mass., U.S.A

For More Precision Faster bring your problems to Heald

5 ways to attach high-speed tips to plain steel shanks

Now that it is necessary to conserve every ounce of strategic alloy elements, many tool-steel users are tipping their tools with high-speed steel, instead of using this scarce material for the entire body of the tool. Here is a detailed tabulation of five ways to tip a plain steel shank with a high-speed tip.

METHOD	1. Low Temperature Brazing or Silver Soldering	2. High Temperature Brazing	3. Fusion Cementing	4. Resistance Butt or Flash Welding
Equipment needed	(1) Heating torch or furnace. (2) Clamp for holding tip in position.	(1) Brazing furnace (Controlled atmosphere).	(1) Heating furnace. (2) Press or machine such as a drill sharpener equipped with special dies.	(1) Resistance butt welding machine. (2) Preheat furnace. (3) Slow-cool facilities.
Correct heat-treatment and shaping of tip	(1) Previously hardened and tempered. (2) Ground or machined to semi-finished size and to fit recess in shank.	(1) Annealed. (2) Ground or machined to semi-finished size and to fit recess in shank.	(1) Annealed. (2) Ground or machined to semi-finished size and to fit recess in shank.	(1) Annealed. (2) Rough cut or machined to fit shank. It is not necessary to recess shank.
Preparation of tip and recess of shank	Washed with carbon-tetrachloride or gasoline to remove grease and dirt.	Same as 1.	Copper coated in solution of copper sulphate or washed with boric acid solution.	None.
Flux	Prepared flux of low melting temperature, sold by various firms.	Borax.	None.	None.
Bonding material	Silver solder ribbon.	Copper foil.	Use one of the popular fusion cements now on the market.	None.
Temperature of operation	Below maximum draw temperature of high-speed steel tip.	At optimum quenching temperature of high-speed steel tip.	Same as 2.	Welding heat confined to surface of tip and shank to be welded.
Cooling after bonding	Air cooled	Quenched in still air, air blast or oil from brazing heat.	Same as 2.	Slow cooled after welding.
Subsequent shaping and heat-treatment	(1) No heat-treatment. (2) Tool may be ground to finished shape.	(1) Tempered to develop best cutting properties in tip. (2) Tool ground to finished shape.	Same as 2.	(1) Tool may be rough shaped to finished size by forging and/or machining. (2) Quenched and tempered to develop optimum cutting properties. (3) Tool ground to finished shape.

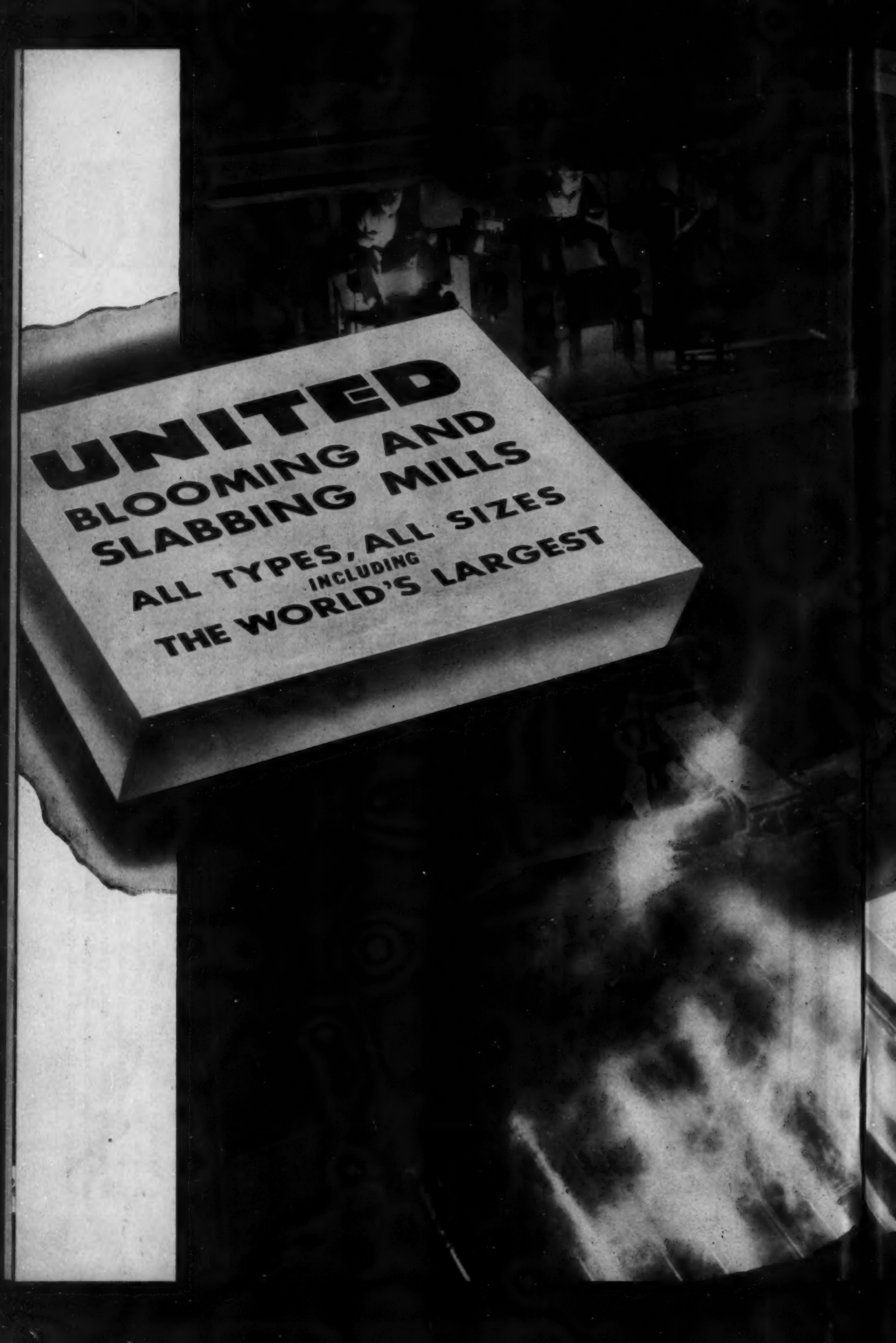
5.

A fifth method of tipping is by electric-arc welding. This is essentially similar to that outlined above under resistance butt or flash welding. The only differences are that you use an electric-arc machine, bevel the edge of the tip and of the shank in preparation for welding, and use 18-8 stainless steel as a bonding material. Preheating and slow-cooling are necessary to produce a satisfactory tool.

Still another way of tipping is of course the long-established mechanical method—simply design a suitable recess in the shank and fasten the tip in place by a set screw or a bolt.

If you have a specific problem on "tipping," write to Bethlehem Steel Company, Bethlehem, Pa. We will be glad to give you help and advice without obligation on your part.

★ ★ BETHLEHEM STEEL ★ ★


UNITED
BLOOMING AND
SLABBING MILLS
ALL TYPES, ALL SIZES
INCLUDING
THE WORLD'S LARGEST

UNITED ENGINEERING *and* FOUNDRY COMPANY

Pittsburgh, Pennsylvania, U·S·A

BEHIND THE SCENES

Successful Experiment

■ Last week we mentioned the success Hudson Motor Car was having in employing former service men, who had been mustered out because of injuries, illness, etc. Now comes an interesting story from Walter Kidde & Co. on the blind workers they have had in the plant for several months now.

It began with a survey conducted by Arthur Voorhees, supervisor for the New Jersey State Commission for the Blind, to determine the type of work the blind could best perform in the Kidde operations. Mr. Voorhees is sightless himself and can operate a wide variety of machines, including a Warner & Swasey turret lathe. Following his recommendations, a group of blind men and women were hired, trained in the plant, and put to work at various operations including inspection, retapping of faulty valve threads, and several types of assembly, among the regular seeing employes.

It has now been demonstrated that the productive capacity of these blind workers is as great as that of the other workers, and not only is their record of work produced an excellent one, but their work spoilage is remarkably low and their score on absenteeism is far above the average.

Their fellow workers have built a number of ingenious devices to facilitate their work, such as jigs which do away with the time otherwise required to feel for proper operating position. More blind workers are being taken on in the Kidde plants, and in other companies, not out of sympathy but because, when suited to the job, they can stand up to any competition. As with Hudson, it throws a hopeful light into the future of our inevitable war casualties.

Finis

■ What a time we've had trying to straighten out the mixup on Peter Fairfax Meyer's misapplied apology to Edward Everett Hale for that poem of his a few weeks ago. Trying to tactfully slide out from under it, we explained that Sir Walter Scott should get all credit for the original, but then out comes the issue saying it was from the *Lady of the Last Minstrel*. Then the storm broke. Down on our head came the wrath of the editors and in through the mail the facetious comments of our private public. We frankly don't know who the "Lady" of the Last Minstrel was, whether there was a Minstrel of the Lake, or even how to recite our ABC's. Shall we just forget the whole thing?

Women in War Work

■ From April, 1942, to June, 1943, there have been 1,833,000 workers added to the payrolls in American factories, and 83.2 per cent of them were women.

Big Bulge

■ Here are some other figures that will give you a pretty good idea of what the metalworking and metal-producing industries have been up to these last few years. In 1939 the industry accounted for 37 per cent of all manufacturing in the country, by 1940 it was up to 42 per cent, 1941 46 per cent and in 1942 it represented 54 per cent of manufacturing activity.

Employment Check

■ And while we're on market figures, STEEL is currently making a recheck on employment in the metalworking industries and on a test to several hundred typical plants finds that 65 per cent of them still employ somewhat near the same as they did a year ago, 23 per cent have jumped up considerably and 12 per cent have gone down. Further returns may change this picture—but we'll give you the full tabulation when it is complete.

West Coast Series

■ The series of articles on the West Coast is causing a lot of comment. If you were vacationing in August when it began we strongly suggest you dig back to the August 16 issue and begin at the beginning. They will continue all through September and into early October. A few tear sheets of the previous articles are still available but it looks like we'll reprint the whole series from the amount of requests coming in.

Boypower

■ Speaking of possibly missing some previous articles, we certainly hope you didn't skip over that story last week on Page 71 on "Boypower". The Portland Machine & Tool Works over in Portland, Ind., a small subcontracting shop now employing some 30 people, has very successfully solved its manpower problem by training boys of high school age for the day shift this past summer, and using bankers, lawyers, clerks from other local businesses on the night shift. It has worked so well that school authorities are cooperating with all industry in the community to develop a system whereby the boys can be rotated on half shifts during the school year. Is this an idea for your own community?

Salesman's Paradise

■ All of you who have had the occasion to do much selling have undoubtedly sat in reception rooms and read those little signs about the purchasing department's visiting hours. Well, here's the copy from a little card a salesman friend of ours is now using to facetiously put the shoe on the other foot.

To My Customers:

Due to my independent position as a salesman, I have decided to show my lines at a time best suited to my convenience.

At the present moment it pleases me to permit you to view merchandise on Tuesdays and Thursdays between the hours of 2:00 and 4:00 P. M. This will allow me to start and extend my week-ends without interruptions, also permit me to devote my mornings to rest and recreation.

Note: The above Regulation applies only so long as the war produces a scarcity of materials. After the war, I will be around begging for business as usual.

Vol. 113, No. 11, September 13, 1943, issue of STEEL, published every Monday at Cleveland, Ohio. Entered as second class matter at the post office, Cleveland, O., under act of March 3, 1879. U. S. and possessions, Canada, Mexico, Cuba, Central and South America, 1 year $6; 2 years $10; all other countries, 1 year $12. Current issues, 25c. Yearbook of Industry issue, $2.00.

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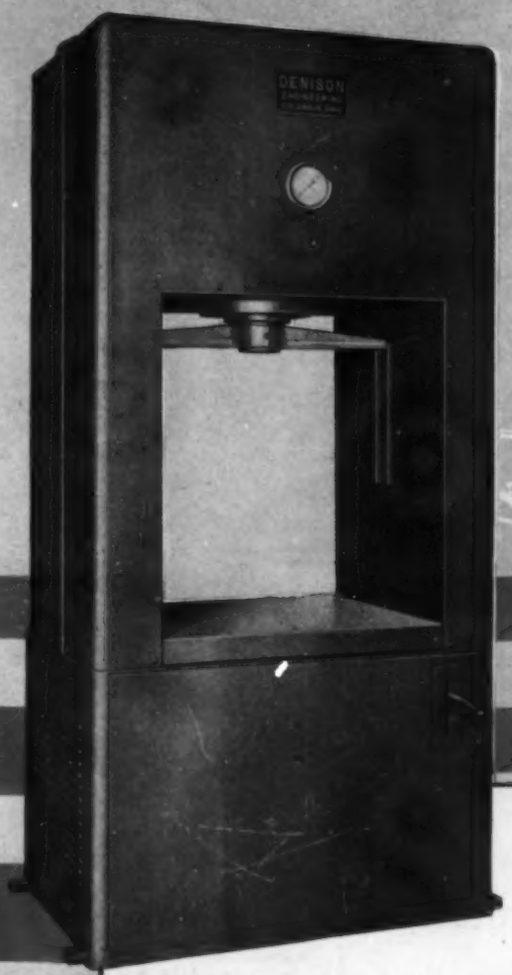
ADEPT AS A "MOSQUITO BOAT"



The DLOS2-50 HydrOILic Press

With the adeptness and maneuverability of a "mosquito boat" streaking through heavy seas for a quick, accurate blow at the enemy, this 50-ton DLOS2 HydrOILic Press is quick to get into efficient action on a wide variety of production needs. Its smooth, flexible oil hydraulic operation proves equally effective on either one-of-a-kind or continuous, production-line assembling, bending, straightening, and broaching. With almost "inch-by-inch and pound-by-pound" accuracy, the operator can control action of the ram according to each individual job requirement, *without pre-set adjustments of any kind.* Yet pressure limits *can* be pre-set from 5 tons upward to capacity, and stroke can be pre-set to a maximum of 18 inches. The DLOS2-50 is a highly compact, fully enclosed unit designed for easy accessibility, space economy and operating safety. Ram control can be either by a convenient hand-lever or by electric push button. Dual controls, for maximum operating safety, are also available. DLOS2-50 is only one of many highly versatile presses in the 5- to 150-ton range in the HydrOILic line. Write for complete information! The Denison Engineering Co., 1163 Dublin Rd., Columbus, Ohio.

INDUSTRY'S NEW RIGHT HAND FOR PRESSING

DENISON EQUIPMENT *in* APPLIED HydrOILics

by CARDOX Fire Extinguishing Performance

Beating the U-boat menace is only one —the final—phase in solving America's shipping problem. Before a battle wagon, flat top, freighter or troopship is ready for its vital job on the high seas, it must be convoyed through shipyard fire hazards.

Vital tons of shipping are serving the United Nations today that might still be only a hope except for Cardox Fire Extinguishing performance that guarded them against fire hazards during construction.

In addition, engineered applications of Cardox Fire Extinguishing Systems are playing a vital "convoying" role in war plants—large and small—producing such necessities as:

Airplanes, Aviation Engines, Aviation Carburetors, Airplane Parts, Engine Parts, Plastics, Rubber Products, Processed Fabric, Tanks, Tank Engines, Cold Strip Steel, Armor Plate, Forgings, Solvents, Motor Fuel, Electric Power.

Cardox Fire Extinguishing Systems give fast complete extinguishment. Timed, mass discharges of *pounds* or *tons* of cold, inert carbon dioxide smother and "cool out" large or small fires. Since there is no damage by the extinguishing medium, time out for repair of plant and equipment is reduced to a minimum.

In addition to producing individual applications of Cardox Fire Extinguishing Systems to protect a wide range of war industries, Cardox is working with industry on new improvements in fire protection to help build a better post-war world.

For further details, write on your company letterhead for Bulletin 893.

CARDOX CORPORATION
BELL BUILDING • CHICAGO 1, ILLINOIS

District Offices in **New York • Washington Detroit • Cleveland • Atlanta • Pittsburgh San Francisco • Los Angeles • Seattle**

How Cardox Systems Protect War Industries

- Timed discharges, as needed, through built-in piping systems . . . supplied instantly from a single storage unit holding tons (if required) of liquid Cardox CO_2.
- Mass discharge of Cardox CO_2 "knocks out" fire, by . . .
- Reducing oxygen content of the atmosphere below the concentration necessary for combustion, and . . .
- Cooling combustibles and fire zone below ignition temperature . . .
- Extinguishing fire quickly and completely *without* damage from extinguishing medium.

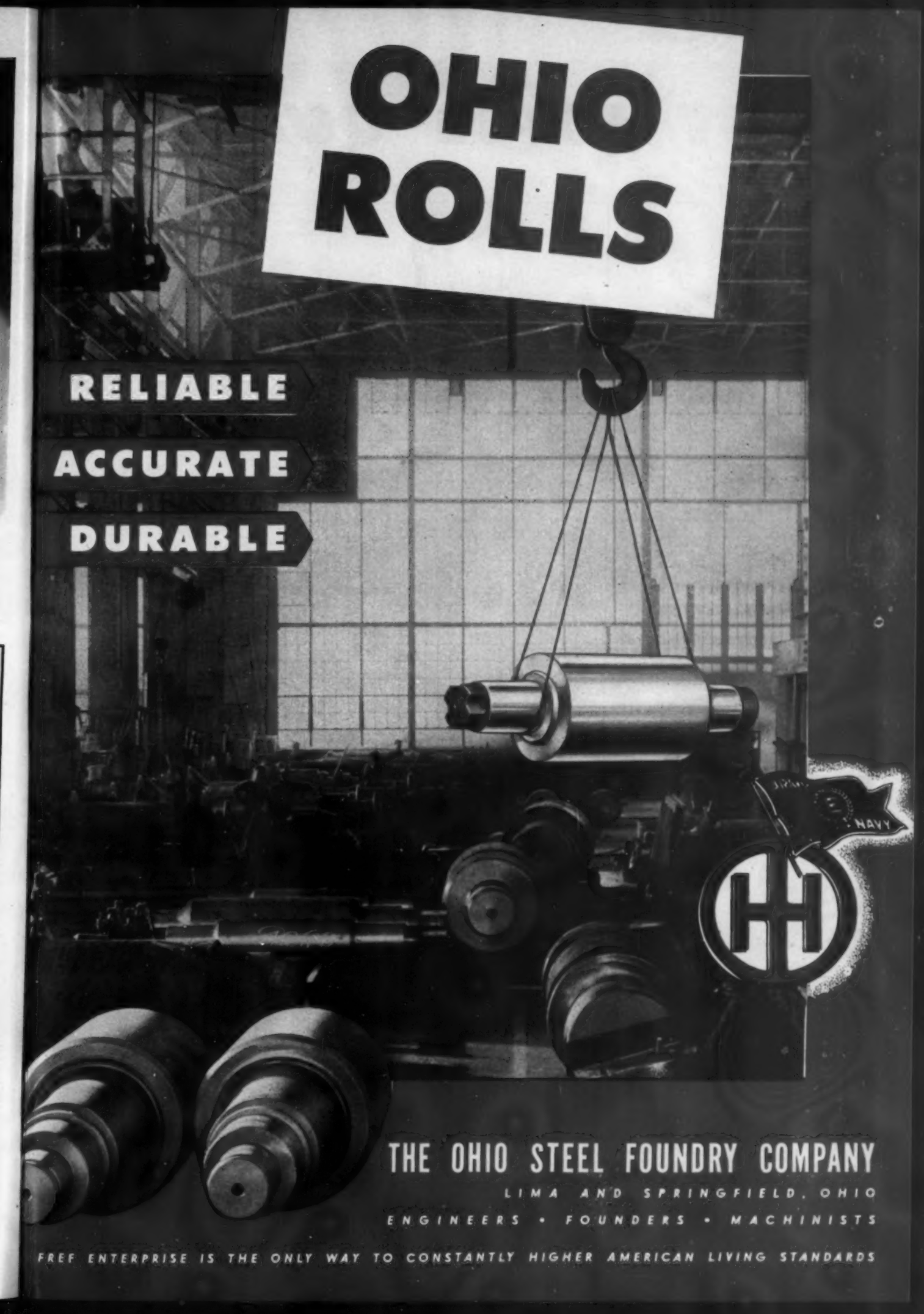
CARDOX—CO_2 Systems with Enhanced Fire Extinguishing Performance

A. Uniformity of CO_2 characteristics.
B. Extinguishing medium with uniformly greater cooling effect.
C. Accurate projection of CO_2 through greater distances.
D. Timed discharges, as needed, through built-in piping systems . . . supplied quickly from a single tank holding tons of liquid Cardox CO_2.

MASS DISCHARGE OF CO2 · ENHANCED COOLING EFFECT · CENTRAL STORAGE UNIT · AMPLE CO2 RESERVE · ENGINEERED SYSTEMS · MANUAL OR AUTOMATIC CONTROL

CARDOX

NON-DAMAGING FIRE EXTINGUISHING SYSTEMS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THE OHIO STEEL FOUNDRY COMPANY
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FREE ENTERPRISE IS THE ONLY WAY TO CONSTANTLY HIGHER AMERICAN LIVING STANDARDS

CUT HOLES - *QUICK!*

1.

Cut true circles quickly, smoothly in any curved metals, plastics, wood, transite.

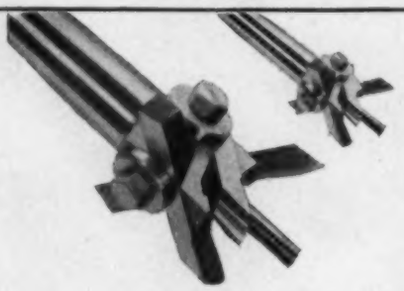
2.

Blades are adjusted to exact diameter. Pilot or lead drill acts as guide. In drill press, holes are cut accurately, quickly. No after reaming or deburring.

3.

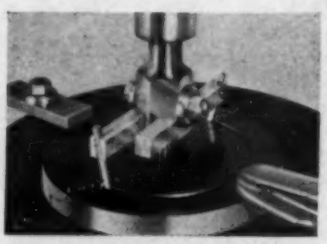
Clark tools are ideal for curved surfaces, thin materials, overlapping cuts, many others.

Cuts holes in heavy pipe, thin tubing or any curved surface.



Clarks Adjustable HOLE CUTTERS

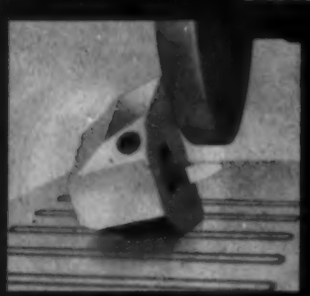
All curved and flat surfaces. 7 sizes cut any fractional diameter ⅜" to 5", up to 1" thick. Blades easily resharpened with Clark Model C grinding fixture, built especially for grinding Clark blades at correct angle.



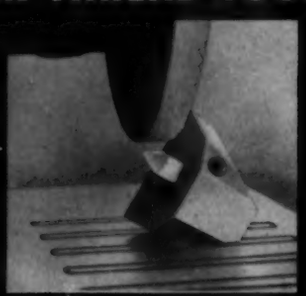
Clarks Adjustable FLY CUTTERS

Pitched blades cut clean holes or discs 4" to 10", up to 1" thick. Model 25G Gasket Cutter quickly cuts gaskets, rings, discs from live rubber, packings, thin plastics. Has retractable pilot and knife edge blades.

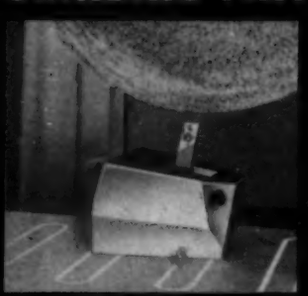
CLARK THREAD TOOL GRINDING FIXTURE



A — End view, positioned for grinding left side of 29° Acme.



B—Positioned for grinding right side of 60° tool bit.



C—Positioned for grinding point of Acme tool bit.

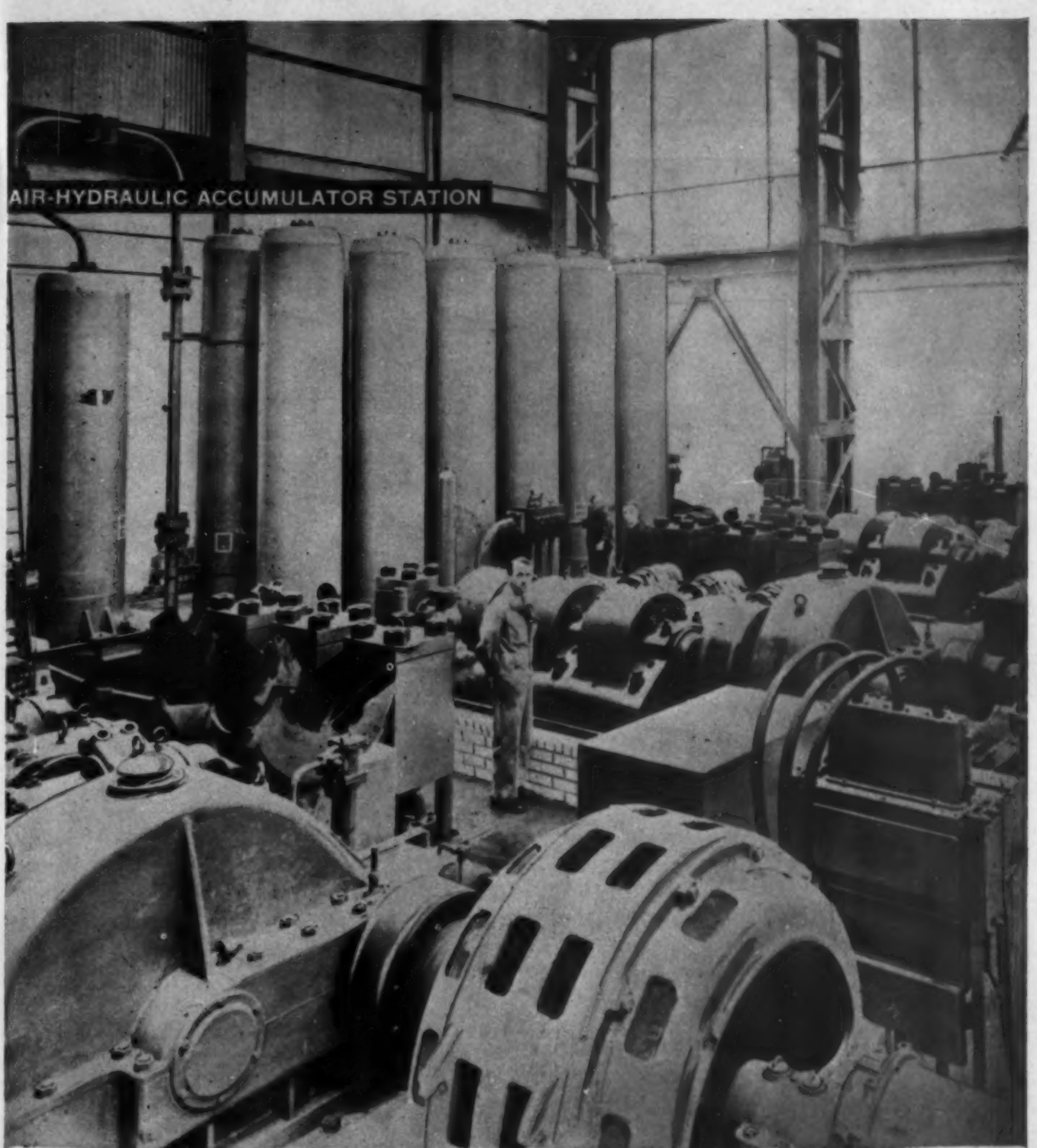
D—Using adaptor, grinding bits for use in Armstrong tool holders.

WRITE TODAY FOR BULLETIN NUMBER 9-S

Robert H. Clark Company

3424 SUNSET BOULEVARD, LOS ANGELES 26

In Canada: DOMINION BEARINGS, LTD., TORONTO, MONTREAL, WINNIPEG. *Export:* THE AMERICAN STEEL EXPORT CO., INC., NEW YORK, LOS ANGELES



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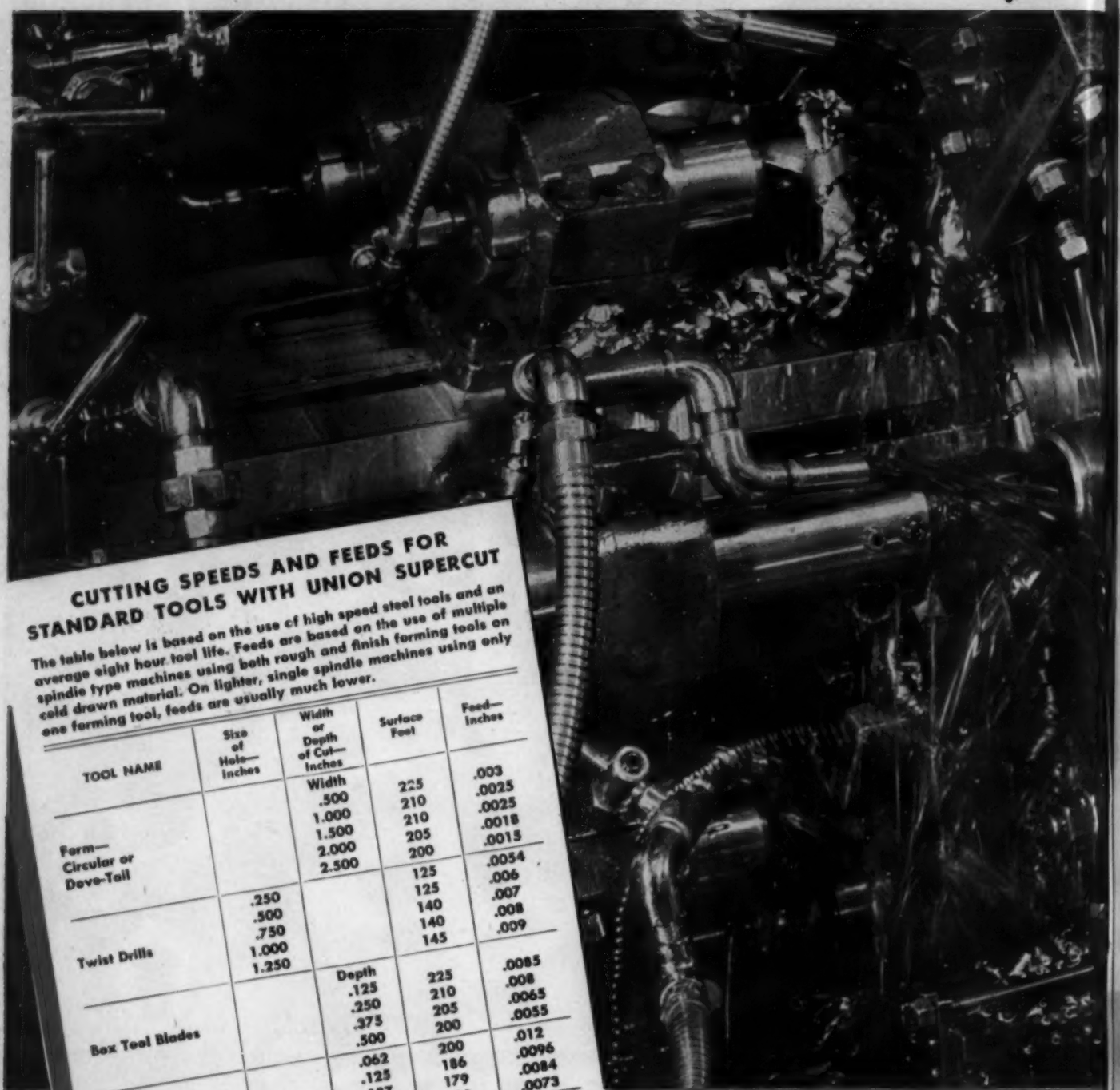


CUTTING SPEEDS AND FEEDS FOR STANDARD TOOLS WITH UNION SUPERCUT

The table below is based on the use of high speed steel tools and an average eight hour tool life. Feeds are based on the use of multiple spindle type machines using both rough and finish forming tools on cold drawn material. On lighter, single spindle machines using only one forming tool, feeds are usually much lower.

TOOL NAME	Size of Hole—Inches	Width or Depth of Cut—Inches	Surface Feet	Feed—Inches
Form—Circular or Dove-Tail		Width .500 1.000 1.500 2.000 2.500	225 210 210 205 200	.003 .0025 .0025 .0018 .0015
Twist Drills	.250 .500 .750 1.000 1.250		125 125 140 140 145	.0054 .006 .007 .008 .009
Box Tool Blades		Depth .125 .250 .375 .500	225 210 205 200	.0085 .008 .0065 .0055
Hollow Mills		.062 .125 .187 .250	200 186 179 172	.012 .0096 .0084 .0073
Knurl Tools In Turret { On / Off			225 225 225	.020 .040 .020
Knurl—Cross Slide			280	.008-.010
Chamfer & Facing			180 180	.0085 .012
Reamers	under ½" ½" or over	Width .062 .125 .187 .250	225 230 235 250	.003 .0035 .0035 .004
Cut Off				

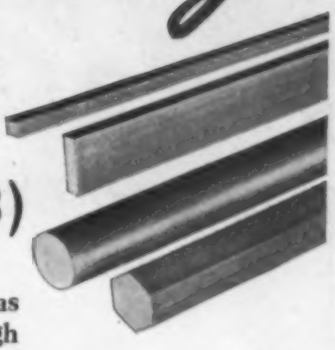
....You'll Find This Data in Your Steel Handbook No. 42

—and you'll find a lot of other information, too, in this helpful book for machine tool users. It provides recommended speeds and feeds for other steels, analyses, physical properties, heat treatment, spindle speeds, weight and area tables, stock estimating tables, etc. Use your handbook and Republic Union Cold Drawn Steels to help keep war production curves on the upward swing.

Steel Available Today-

UNION SUPERCUT

(Free-Machining Bessemer • A.I.S.I. B 1113 • S.A.E. 1113)



Production efficiency has jumped to new highs. Valuable time lost by shut-downs for too-frequent tool changes has been saved. Increases in output of 50 to 100% have not been unusual—with some rising to 200% and higher when equipment and part design would permit. New records have been established for automatic screw machine output. All because of the development and constant improvement of UNION SUPERCUT—the fastest-machining steel available today.

UNION SUPERCUT was the original high-sulphur Bessemer Screw Steel. The present product bearing this name is the result of improvements made time after time as laboratory research and shop experience indicated how its combination of high machinability, fine machined surface and long tool life could be bettered.

This free-cutting steel is *uniformly* machinable bar after bar and shipment after shipment. It retains all the physicals of high-quality Bessemer Steel. It is remarkably free from abrasive elements that dull tool edges. It machines to a smooth, bright finish—produces full, sharp threads and accurate, small details. It may be used for cyaniding and carburizing on parts for which Bessemer Steel is suitable.

UNION SUPERCUT was developed primarily for high speed machining—and thus finds its greatest use on late model "automatics". But, because of its ability to take heavier feeds, it sometimes may be employed efficiently on slower equipment. Where high cutting speed is not necessary, however, its companion steel—UNION FREE CUT—will provide the same qualities with the exception of machining speed.

Like all *Republic* UNION COLD DRAWN STEELS, which include also the open-hearth and electric furnace analyses for applications requiring higher physicals, UNION SUPERCUT and FREE CUT are processed to provide steel parts producers with bars which will enable them to obtain highest production efficiency and greatest output of perfect parts at lowest cost per piece.

And Union Drawn metallurgists and engineers are ready to help you achieve those goals in your plant.

REPUBLIC STEEL CORPORATION
Union Drawn Steel Division
Sales Offices: Massillon, Ohio
GENERAL OFFICES • • CLEVELAND, OHIO
Berger Manufacturing Division • Culvert Division
Niles Steel Products Division • Steel and Tubes Division
Truscon Steel Company
Export Department: Chrysler Building, New York, New York

Republic

UNION COLD DRAWN STEELS

Free-Machining Bessemer, Open-Hearth and Electric Furnace Steels
•
Union Cold Drawn Special Sections
•
Union Cold Drawn and Ground Rounds; Turned and Polished Rounds; and Turned, Ground and Polished Rounds (Union Precision Shafting).

made of

DUCTILITY
IT'S INHERENTLY FINER GRAIN MAKES ALL THE DIFFERENCE
STRENGTH

GREAT LAKES QUALITY STEELS

The N-A-X 9100 Series

Snap-on and Blue-Point Tools made by the Snap-on Tools Corporation of Kenosha, Wisconsin, are built to meet the exacting standards of professional mechanics. This means that only the finest steels and the most expert processing are used in their manufacture.

The selection of N-A-X 9100 Series for the tools shown above is therefore convincing proof of high quality, as well as an example of the versatility of these low alloy steels. For N-A-X 9100 Series is widely used today, not only in all types of ordnance equipment but also in scores of other important applications.

If you have need for a High Tensile steel—or a carburizing steel—or a medium and deep hardening steel—it will pay you to investigate the properties of N-A-X 9100 Series of alloy steels.

Send for your copy of a new booklet describing these steels. It's yours for the asking.

GREAT LAKES STEEL CORPORATION
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When is a SOCKET SCREW Ready to Serve!

P-K "Chefs" prepare "Recipes" for every size and type . . . control Heat Treatment to assure *uniform* Hardness and Toughness

Socket Screws must be served up *tough* – never tender. Parker-Kalon technicians prepare individual "recipes" for each small range of sizes and types, by making test heats in special lab furnaces. These instructions are then precisely followed in production heat treatment, checked by modern error-proof instruments, to make sure you get screws of proper hardness and ductility, without variation.

In addition to Heat Treating Control, 15 other check-ups are made to assure the reliable performance of P-K Cold-forged Socket Screws. This rigid routine of *quality control* eliminates the "doubtful screws" – screws that *look* all right, but some of which fail to *work* right. Socket Screw users need this protection today more than ever. Specify "Parker-Kalon" next time you order . . . it costs no more. Parker-Kalon Corp., 194-200 Varick Street, New York 14, N. Y.

This 16-point "Quality-Control" protects P-K Socket Screw Users

1–Chemical Analysis. 2–Tensile Strength. 3–Ductility. 4–Torsional Strength. 5–Ability to take Shock Loads under Tension. 6–Resistance to Shock Loads under Shear. 7–Hardness. In addition, there is a rigid inspection of these essentials: 8–Head Diameter. 9–Head Height. 10–Concentricity of Head to Body. 11–Socket Shape. 12–Socket Size. 13–Socket Depth. 14–Centricality of Socket. 15–Class 3 Fit Threads. 16–Clean Starting Threads.

PARKER-KALON
Quality-Controlled
SOCKET SCREWS

Saves Machining Time

•

Greater Accuracy, Uniformity in Wall Thickness and Width Dimensions

•

Many Finishing Operations Entirely Eliminated

•

Closer Tolerances

•

Reduced Costs

25 YEARS' EXPERIENCE IN WELDED RINGS AND BANDS

Our complete facilities, experience and equipment are available to any user of rings and bands. Let us show you how it will be to your advantage to use American WELDED Rings, Bands and Ring Assemblies in diameters from 4½ inches to 8 feet.

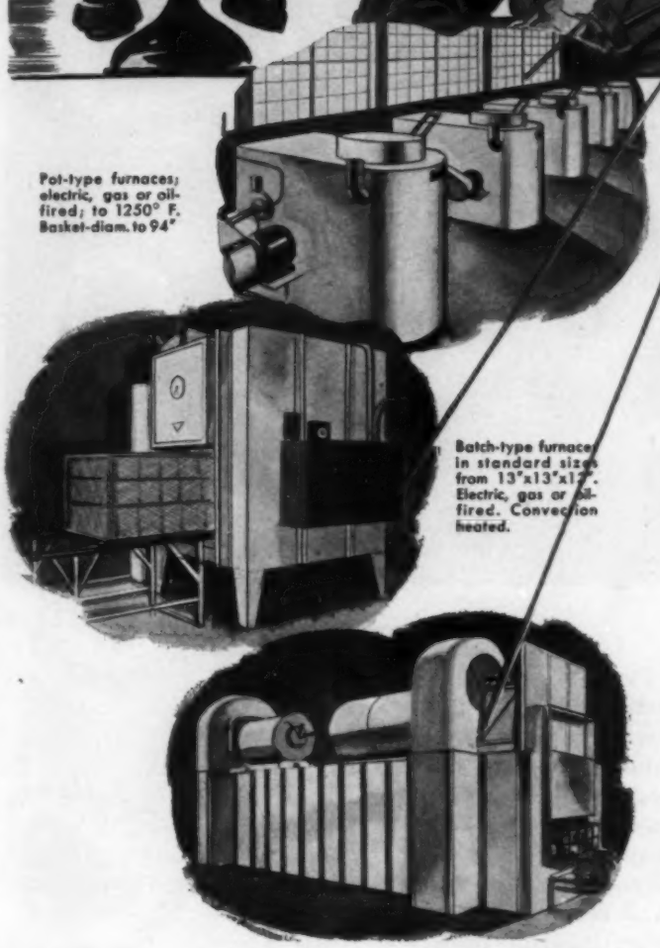
Send for folder, "Welded Rings and Bands".

STEEL PRODUCTS FABRICATED BY RESISTANCE, SPOT, ARC OR GAS WELDING

THE AMERICAN WELDING & MANUFACTURING CO. • Warren, Ohio

BRANCH OFFICES IN PRINCIPAL CITIES

WHICH DESPATCH FURNACE IS BEST FOR MY JOB?



Pot-type furnaces; electric, gas or oil-fired; to 1250° F. Basket-diam. to 94"

Batch-type furnaces in standard sizes from 13"x13"x18". Electric, gas or oil-fired. Convection heated.

Conveyor type furnaces for volume production. Uses any fuel. Entirely automatic in operation.

No trigger-quick answer to this question will you get from a Despatch engineer. He knows, as you do, that the best Despatch furnace for your particular needs cannot be a subject of snap judgment nor be decided from an arm-chair.

Instead, our engineer first asks *what* you want to accomplish, *where* it is to be done, and *how* you wish to proceed. Then, after a careful, unbiased check-up of your plant, he recommends the Despatch furnace which will do *your* job most effectively and at lowest cost.

6-Point Plant Survey . . . FREE

Here are the chief points which a Despatch engineer considers in determining the furnace to recommend:

1. Process involved
2. Material handled
3. Production desired
4. Space requirements
5. Labor available
6. Fuel to be used

Assures Better Production at Less Cost

Direct result of this on-the-job survey is to your advantage, and ours. *You* get the right Despatch furnace to give you most production and highest quality at lowest operating cost . . . a furnace that is ideally suited to your plant set-up in every way, with ample reserve capacity for tomorrow's even bigger postwar jobs. And we? Well, we have one more *completely* satisfied customer whose confidence we have honestly earned.

WIRE, PHONE OR WRITE TODAY!

DESPATCH
OVEN COMPANY MINNEAPOLIS

DESPATCH ENGINEERS IN THESE CITIES

ALBANY, NEW YORK
BIRMINGHAM, ALABAMA
BLUEFIELD, WEST VIRGINIA
BOSTON, MASSACHUSETTS
BUFFALO, NEW YORK
CHICAGO, ILLINOIS
CLEVELAND, OHIO
DALLAS, TEXAS
DAYTON, OHIO
DETROIT, MICHIGAN
INDIANAPOLIS, INDIANA
LOS ANGELES, CALIFORNIA
MILWAUKEE, WISCONSIN
NEWARK, NEW JERSEY
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RAMTITE PRODUCTS SERVE EVERY INDUSTRY USING HEAT

JUST THE RIGHT REFRACTORY FOR HEAT TREATING FURNACES

RAMTITE PRODUCTS

Ramtite Plastic Refractory ... in three grades

Fracto-Crete and Mono-Cast castable refractories

Esso Bond air set refractory mortar

Hot patch heat set refractory mortar

Esso (silicon carbide base) patching and ramming mixes

Safe-tie Refractory Anchors

RAMTITE is ideal for lining Heat Treating Furnaces because (1) it is installed in plastic form and is easily shaped to the proper furnace contour; (2) its resistance to fluctuating temperatures is outstanding; (3) it has a high insulating value; (4) its smooth, dense surface gives maximum reflection of heat to work; (5) there are no joints through which heat can escape; (6) it has an exceptional combination of engineering properties.

Ramtite was used for the side walls and hinged roofs of this normalizing furnace for flame cut steel shapes. A typical Ramtite installation. Send for a bulletin describing the engineering properties of Ramtite.

THE RAMTITE CO. ..... *Division of The S. Obermayer Co.*
2557 SOUTH ROCKWELL STREET CHICAGO 8, ILLINOIS

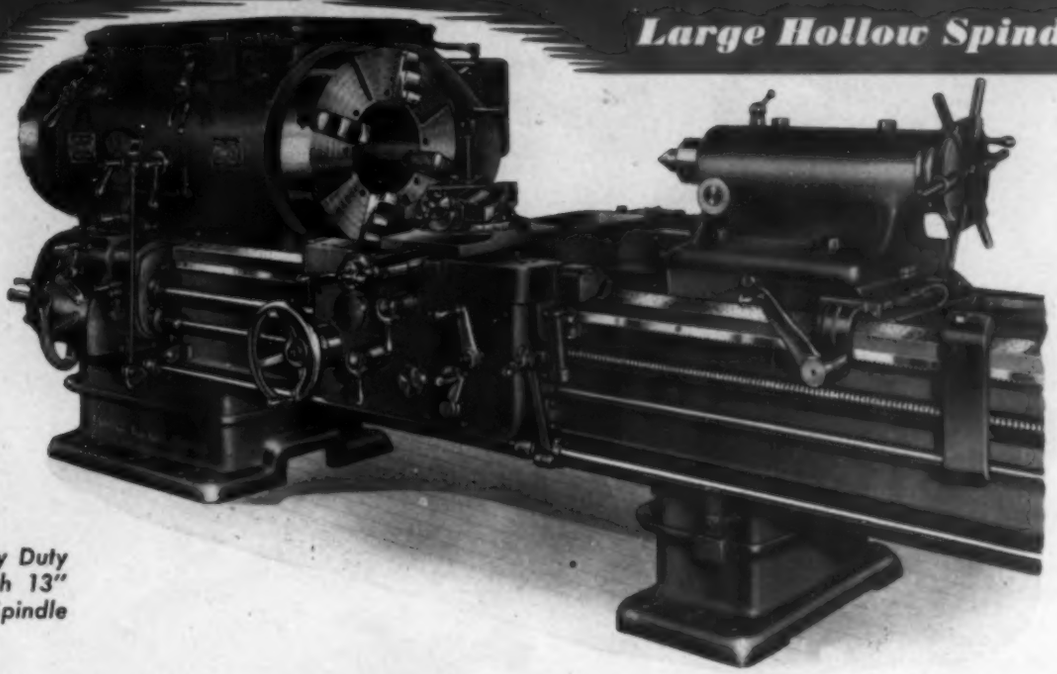
RAMTITE

PLASTIC REFRACTORY

HYDRATROL LATHES

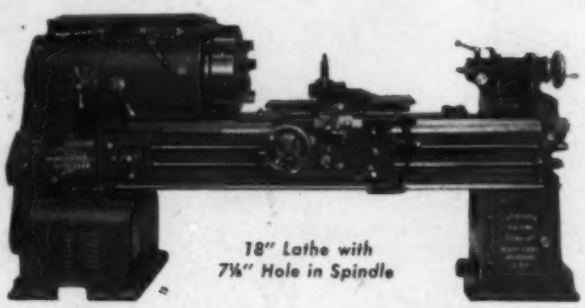
Wide Range of Sizes Provide Efficient Application to a Wide Range of Work!

Large Hollow Spindle Type



30" Heavy Duty Lathe with 13" Hole in Spindle

Complete Line of Sizes from 18" to 36" . . .



18" Lathe with 7¼" Hole in Spindle

SMALL—18" . . . . . Up to 7¼" Hole
MEDIUM—24" . . . . Up to 12" Hole
LARGE—27" . . . . . Up to 13" Hole
LARGE—30" . . . . . Up to 14" Hole
LARGE—36" . . . . . Up to 16½" Hole

8 Distinctive Features

- Easy, Fast, Simple Operation.
- Hydraulic Brakes and Clutches.
- Absence of Mechanical Troubles.
- Essential Operating Information Automatically Presented (on all Standard Models).
- Automatic and Ample Lubrication.
- Mechanism Protected by Automatic Control.
- Extraordinary Hardness of Bed.
- Available with Large Turrets for carriage which fully utilize the Great Power Capacity of these machines; and with Beds on both ends of Headstock.

Lehmann MACHINE COMPANY

CHOUTEAU AT GRAND ★ SAINT LOUIS (3) MISSOURI

ABLE TO TAKE IT--

IN THE TOOL ROOM OR ON THE PRODUCTION LINE

Built to "dish it out" and take it, too, Uncle Sam's tanks demand tough materials and skilled design to give them stamina and striking power.

The same principles hold for milling machines —the machine tools that are mighty important in building tanks and other weapons. In tool room or on the production line, milling machines must be built to perform at a record-breaking pace and maintain close tolerance-accuracy in operation.

The center bearing on the spindle of Milwaukee Milling Machines reduces by one-half the distance between bearings—*increases rigidity eight times!*

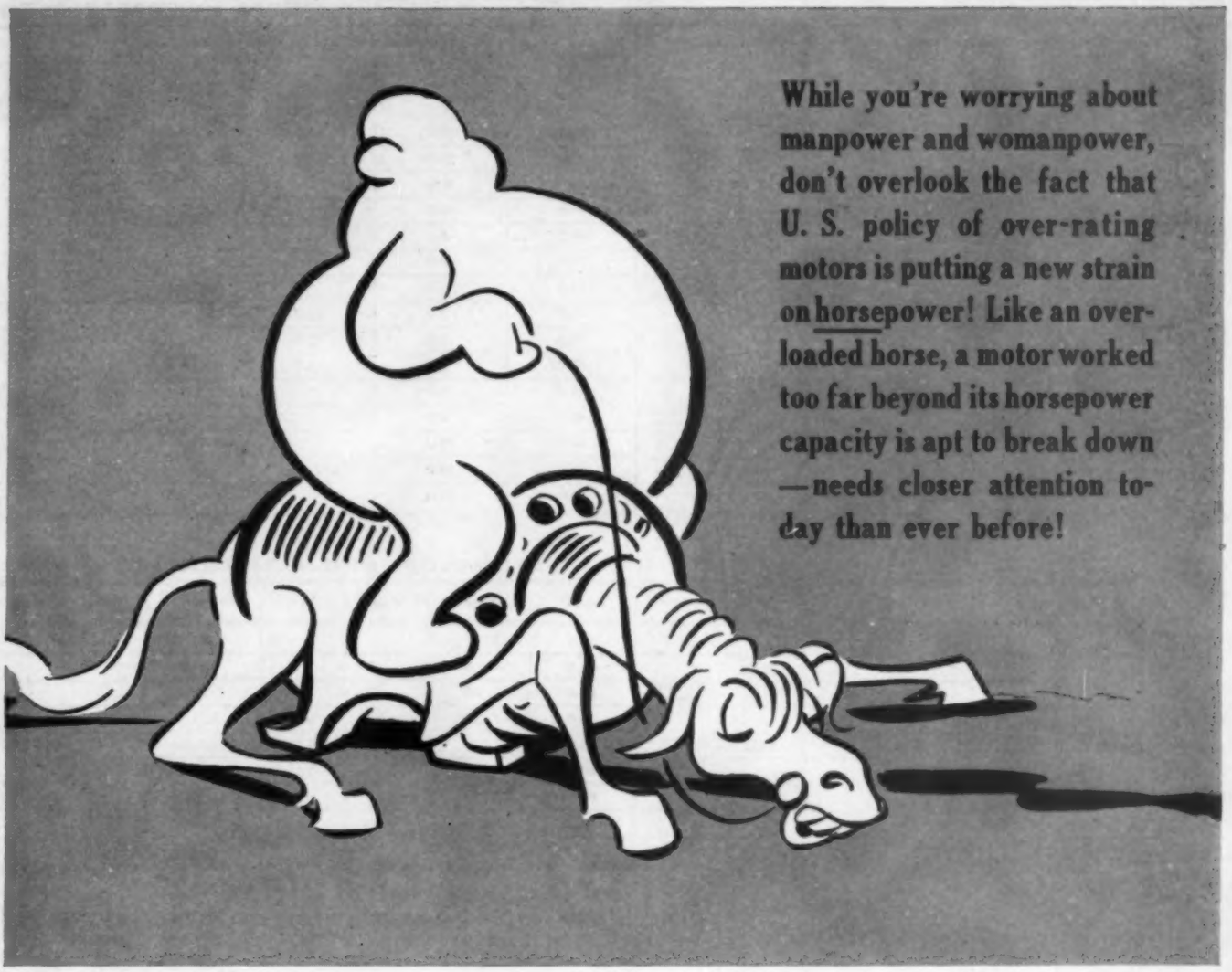
Ask the man at the controls of a Milwaukee—he can tell you how important this center bearing is (in addition to the husky column) in providing built-in rigidity and all that it means in sustained accuracy — longer cutter life —smoother performance at all speeds and feeds.

KEARNEY & TRECKER
CORPORATION
MILWAUKEE, WISCONSIN

Buy Victory with at least 10% in War Bonds!

Milwaukee MACHINE TOOLS

DON'T FORGET HORSEPOWER!



While you're worrying about manpower and womanpower, don't overlook the fact that U. S. policy of over-rating motors is putting a new strain on horsepower! Like an overloaded horse, a motor worked too far beyond its horsepower capacity is apt to break down —needs closer attention today than ever before!

WHAT WAS GOOD motor maintenance in peacetime, just isn't good enough today! Many motors are working *3 and 4 times* as many hours a week today . . . need wartime care . . . the kind set forth in Allis-Chalmers' new "Guide to Wartime Care of Electric Motors." This interesting, *fully illustrated* book looks at motor maintenance from a *new* perspective . . . describes in detail the 9 main enemies of motor life . . . tells you where to look for them, how to fight them. To experienced men it will serve as a valuable "refresher" . . . to new employees, as a *valuable training course.*

Over 100,000 copies are in use by the armed forces and war industry. World-wide demand has necessitated Spanish and Portuguese editions! "Guide to Wartime Care of Electric Motors" is *free!* Write for your copy. ALLIS-CHALMERS, MILWAUKEE 1, WIS. A 1639

ALLIS-CHALMERS MOTORS

When you do need new motors, look into the strength, solidity and all-around protection of the new "Safety Circle"—protected top, sides, ends and bottom.

A-C WE WORK FOR VICTORY WE PLAN FOR PEACE

SHENANGO-PENN
CENTRIFUGAL CASTINGS

BRONZES • • COPPER • • TIN

	Comparative Government and Society Specifications						Desired Chemical Analysis				
S-P-M. Co. Alloy No.	U. S. Navy	Federal	Air Corps	S.A.E.	A.M.S.	A.S.T.M.	Copper	Tin	Lead	Zinc	Phos.
1	46B23a	QQB-691a Comp. 2	11306 Gr. A	40	(Ounce Metal)	B145-41T Alloy 4A	85.0	5.0	5.0	5.0	
2				64	4842	B144-41T Alloy 3A	80.0	10.0	10.0		
3				63			88.0	10.0	2.0		
4	46B5h	QQB-691a Comp. 6	(Gun Metal)	62	4845A	B143-41T Alloy 1A	88.0	10.0		2.0	
5	46B8g	QQB-691a Comp. 1	("M" Metal)			B143-41T Alloy 2A	88.0	6.5	1.5	4.0	
8	46B23d Gr. II	QQB-691a Comp. 8					84.0	8.0	8.0		
9				660		B144-41T Alloy 3B	82.5	7.5	7.5	2.5	
10		QQB-691a Comp. 7					75.0	6.0	19.0		
11				67		B144-41T Alloy 3D	78.0	7.0	15.0		
17		QQB-691a Comp. 3					87.0	6.0	3.0	4.0	
18				65			90.0	10.0			
19	46M6g	QQB-691a Comp. 5	11306 Gr. B	("Q" Metal)		B143-41T Alloy 1B	88.0	8.0		4.0	
21	46B23d Gr. IV	QQB-691a Comp. 10				B22-36T Class A	81.0	18.5			.5
22						B22-36T Class B	82.5	17.0			.5-1.0
23	46B9d		(Journal	Bronze)			83.0	13.5		3.5	

ALUMINUM AND MANGANESE BRONZES

Alloy No.	U. S. N.	Federal	A. C.	S.A.E.	A.M.S.	A.S.T.M.	Copper	Alum.	Mang.	Iron	Zinc	Nickel	Others
12							70.0				30.0		
14A					4871		85.0	11.0		4.0			
14B	46B18c			68A		B148-41T Gr. A	88.0	9.0		3.0			
14C		QQB-671a Class C	11076				78.0	7-12.0	3.5	3.5		3.5	1.0
15	49B3c	QQB-720b Class A		43	4860	B132-41T Class A	55.0	1.0	2.5	1.5	Remainder		1.0
15S	46B29 Class B	QQB-720b Class B				B132-41T Class B	60.0	1.5	3.5	2.0	Remainder		1.0
15HT	46B29 Class A	QQB-720b Class C			4862		63.0	5.5	3.0	3.5	Remainder		
16B							63.0	2.5			Remainder		2.0
24	46B10f	QQB-631 Comp. A					63.0				36.0		Tin 1.0

SPECIAL ALLOYS • • COPPER - SILICON • NICKEL - SILVER

Alloy No.	U. S. N.	Federal	A. C.	S.A.E.	A.M.S.	A.S.T.M.	Copper	Silicon	Mang.	Zinc	Iron	Tin	Lead	Nickel
13A	46B28	QQC-593	(Copper	Silicon-Everdur)			94.5	4.5	1.0					
13B	46B28	QQC-593	(Copper	Silicon-Herculoy)			90.0	3.0	1.5	3.0	1.5	1.0		
20			(Nickel	Silver)			65.0			15.0		2.0	6.0	12.0
25	46M1f	QQC-551	(Monel	Metal)			23.0	1.5	3.5		3.5			60.0
26			(Modified	Monel Metal)			60.5	1.5	1.5		1.5			35.0

Aluminum — Made in recognized Aluminum-Silicon Alloys — to specification — for Recommended Applications — Write for information.

SHENANGO - PENN PLAIN AND

Alloy No.	U. S. N.	Federal	A. C.	S.A.E.	A.M.S.	A.S.T.M.	Silicon	Mang.	Sulphur	Total Carbon	Nickel	As Indicated	Chrome
29	46I6c	QQI-651					1.8 -2.2	.90-1.2	Under .10	3.2 -3.6	As Desired		
30	46I5c Class C & D	QQI-656		(Semi-	Steel)		1.5 -1.8	.80-1.0	Under .08	2.9 -3.2	1.0-2.0	Moly. .25-.75	
31				(Special	Roll Mixture)		1.4 -1.7	.70-.85	Under .10	2.6 -3.1	.50-1.0		.35-.75
28	46I9		(Ni-Resist-	Scale Resisting)			1.25-2.0	1.0-1.5	.04-.12	2.75-3.1	12.0-15.0	Copper 5.0-7.0	1.5-4.0

Note 1: Common names are given in italics.

Note 2: High tin alloys are now limited due to war restrictions.

Suitable substitutes can generally be used based upon actual experience.

FERROUS AND NON-FERROUS ALLOYS

• • LEAD • • ZINC ALLOYS

	Average or Minimum Physical Properties						APPLICATIONS**										
S-P.M. Co. Alloy No.	Tensile Strength Lbs. Per Sq. In.	Yield Point Lbs. Per Sq. In.	Elong. in 2" Per-centage	Com-pression Yield Lbs. Per Sq. In.	Brinell 500 Kg.	Wt. per Cubic In.	Bearings	Bushings	Liners	Sleeves	Glands	Ball Bearing Caps	Rings - Washers	Gears - Nuts	Marine Bearing Housings	Roll Covers Drum - Rolls	S-P.M Co. Alloy No
1	28,500	19,500	15.0	12,000	60	.318	X	X	X	X	X		X		X		1
2	29,000	21,500	8.0	15,000	65	.322	X	X									2
3	32,000	19,000	16.0	16,000	68	.315			X	X						X	3
4	38,000	21,000	20.0	16,500	70	.315	X		X	X			X	X		X	4
5	40,000	20,000	26.0	18,000	60	.315			X	X	X		X		X	X	5
8	25,000	15,000	8.0			.320	X		X								8
9	29,500	22,000	10.5	20,440	62	.318	X	X			X		X				9
10	21,000	20,000	1.0		45	.328	X										10
11	25,000	15,000	8.0	19,600	50	.325	X		X				X				11
17	32,000	20,000	18.0	20,340	67	.318			X	X	X		X			X	17
18	35,000	21,500	12.0	23,600	85	.316			X				X	X			18
19	42,000	21,000	25.0	20,340	70	.315			X	X			X			X	19
21	40,000		.5		135	.314	X										21
22	37,000		1.0	18,000	100+	.314	X										22
23	32,000	23,000	12.0		75+	.313	X	X		X			X				23

• • COPPER - ZINC ALLOYS

Alloy No.	Tensile Strength	Yield Point	Elong. in 2"	Com-pression	Brinell	Wt. Cu. In.											
12	28,000	16,000	22.0		65	.283			X			X	X				12
14A	80,000	40,000	12.0	35,000	170*	.274				X				X			14A
14B	65,000	32,500	20.0	18,500	115	.273	X			X				X			14B
14C	75,000	35,000	15.0		140*	.280				X				X			14C
15	72,000	33,000	25.0		143*	.288			X	X		X		X			15
15S	90,000	40,000	18.0		174*	.289			X	X				X			15S
15HT	110,000	55,000	12.0		223*	.290			X	X				X			15HT
16B	62,000	35,000	18.0		120	.280				X			X				16B
24	30,000	18,000	18.0		75	.280		X	X			X			X		24

•• MONEL METAL • ALUMINUM • COPPER

Alloy No.	Tensile Strength	Yield Point	Elong. in 2"		Brinell	Wt. Cu. In.											
13A	45-50,000	30,000	24.0		99	.316		X					X			X	13A
13B	45-50,000	20-25,000	35-40		90	.318		X					X			X	13B
20	34,000	17,500	30.0		50	.306					X		X				20
25	65,000	32,500	25.0		130	.320			X	X						X	25
26	70,000	38,000	13.0		150*	.322			X	X						X	26

Copper — Made for Special Applications and Limited Conductivity and Corrosion Problems — Write for information.

ALLOYED CAST IRON

Alloy No.	Tensile Strength	Transverse Test		Brinell	Wt. Cu. In.										
		Minimum Load	Minimum Deflection												
29	28,000 Min.	2,000 Lb.	.24"	175-190*	.262		X	X				X			X	29
30	40-55,000	3,000-3,600 Lb.	.25" to .35"	225-275*	.263		X	X	X			X			X	30
31	40,000 Min.	3,000 Lb.	.30"	255-300*	.262				X						X	31
28	20-25,000	3,000-4,000 Lb.	.20" to .30"	120-180*	.270			X	X	X					X	28

*Brinell at 3,000 Kg. load.

**Tabulated "Applications" must by necessity be general in scope—Write for our recommendations.

For additional copies of this Chart and other information on Centrifugal Castings, write

SHENANGO-PENN MOLD CO.
415 W. 3rd St. Dover, Ohio

4 Operations with minimum changing time

1. MORSE TAPER OR STRAIGHT SHANK DRILLS

2. TAPPING

3. STUD SETTING

4. NUT SETTING

It's no trick at all to change from one tool to another with APEX Quick Change Drill Chucks. Even green operators can do it—*with one hand*—without stopping or even slowing down the machine.

Apex Chucks are for use in drill presses, radials, multiple spindle machines, lathes, hand screw machines, tapping machines, electric and air tools. Shanks other than Morse Taper, can be furnished to suit machine spindle.

The collets are driven by hardened ball nosed plungers and are guaranteed not to fall out during the life of the chuck. Plungers are so designed that dirt cannot clog the hole and interfere with operation of the chuck.

Write for catalog 14.

APEX

THE APEX MACHINE & TOOL CO., DAYTON, OHIO

Manufacturers of Safety Friction Tapping Chucks, Quick Change and Positive Drive Drill Chucks, Vertical Float Tapping Chucks, Parallel Floating Tool Holders, Power Bits for Phillips, Slotted Head and Clutch Head Screws, Hand Drivers for Phillips and Clutch Head Screws, Aircraft Universal Joints, Plain and Universal Joint Socket Wrenches.

2 Things to Remember WHEN YOU ORDER HACK SAW BLADES

"A Borg-Warner Product"

First You need not be seriously handicapped by the restrictions on 18-4-1 for Hack Saw Blades, due to the shortage of vital alloys. The timely development of D-B-L Steel gives you lower cost blades with tough cutting edges, high impact resistance, and relative freedom from decarburization.

Second Only Ingersoll Steel Mills have had 4 years' experience in producing sheets of D-B-L Steel exclusively for Hack Saw Blades.

Blades made of Ingersoll D-B-L Steel are available from leading makers of Hack Saw Blades. Be doubly sure of satisfaction by specifying—"Made of Ingersoll D-B-L Steel"—on orders for Hack Saw Blades.

INGERSOLL D-B-L HACK SAW STEEL

(Tungsten 5.00-6.00
Molybdenum . . 4.00-5.00)

The remarkable performance of Ingersoll D-B-L . . . its relative freedom from decarburization . . . its tough cutting quality and its high impact resistance . . . plus its lower cost, have made it a wartime favorite.

INGERSOLL SPECIAL STEELS FOR SPECIAL USES

Alloy Steels
Armor Plate
Clutch Plate Steels
Tillage Steels
Soft Center Steels
Shovel Steels
Knife Steels
TEM-CROSS Steel
IngAclad (Stainless-Clad Steel)
Stainless Steels and Saw Steels, including "18-4-1" and Molybdenum and D-B-L Hack Saw Steels.

INGERSOLL STEEL & DISC DIVISION

BORG-WARNER CORPORATION

NEW CASTLE, INDIANA

Plants: New Castle, Indiana; Chicago, Illinois; Kalamazoo, Michigan

INGERSOLL D-B-L HACK SAW STEEL

MORE THAN A MATCH

FOR ANY BILLET GRINDING JOB

Electro BILLET GRINDING WHEELS

- MORE RAPID METAL REMOVAL
- TOUGHER AND MORE DURABLE—ruggedly constructed and heat resistant
- MORE UNIFORM QUALITY and DEPENDABILITY
- AVAILABLE FOR PROMPT DELIVERY

ELECTRO REFRACTORIES AND ALLOYS CORP.

EXECUTIVE OFFICES: VARS BUILDING, BUFFALO 2, N. Y.

Manufacturers of Crucibles, Alloys, Stoppers, Refractories, Grinding Wheels

Rough on Rats

—and Rough on the Parts That Make It "Talk"

ArmaSteel*

The American heavy machine gun is a tough customer to come up against, whether on the ground or in the air. It throws a lot of lead in a little time.

More than a score of the parts that go into this gun are made of ArmaSteel. This versatile metal has proved its ability to withstand the shock and strain of combat usage, and to adapt itself to the wide range of physical characteristics required by war equipment.

Yet the big story on ArmaSteel, recorded in newspaper and periodical reports on war production, is the important savings in time and critical materials it has accomplished. ArmaSteel castings substantially reduce machining time and tool wear. They lend themselves to new methods and practices which speed the manufacture of finished products.

ArmaSteel deserves a place in the work you are now doing and in future operations.

BACK THE ATTACK WITH WAR BONDS

★

SAGINAW MALLEABLE IRON
DIVISION OF GENERAL MOTORS
Saginaw, Michigan

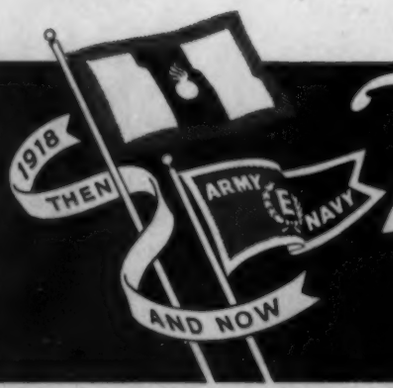
*Reg. U. S. Pat. Off.

CAST FOR A LEADING ROLE IN INDUSTRY

They ADD...

and subtract FIGURES!

Punch buttons or push pedals — springs are there to make it easier to do. Many of the usual jobs for springs are now war jobs—with more than ordinary service required. Where engineering knowledge has been applied to spring design, this extra duty is faithfully absorbed. Because it is sometimes hard to know when a mechanism must undergo unusual conditions of corrosion or heat and cold, it is well to pay particular attention to the selection of the spring that makes it go. Springs must stay alive, if mechanisms are to last.



Barnes-made Springs

ENGINEERED PEP AND POWER

WALLACE BARNES COMPANY

DIVISION OF THE ASSOCIATED SPRING CORPORATION

BRISTOL, CONNECTICUT

NOW, industry's heaviest machines can be "bossed" by signals no more powerful than a cautious wink. Steel-mill flying shears and bomber gun turrets perform as if controlled by magic. Paper winder rolls are being regulated by the minute output of electric eyes.

Tomorrow, countless other machines will be obeying whispered signals initiated by power . . . motion . . . light color . . . sound . . . temperature.

The partnership of industrial electronics and G-E amplidynes—expertly matched by G-E engineers—opens vast new possibilities for stepping up milliwatts to kilowatts, with a fast and precise response to the slightest change in the input signal.

How does this partnership work?

The *milliwatt* output of detecting devices such as phototubes, selsyns, or pilot generators is first amplified electronically to about *one watt*. Instantaneously, the amplidyne adds another powerful boost, furnishing the *kilowatts* required to drive or control industrial machines.

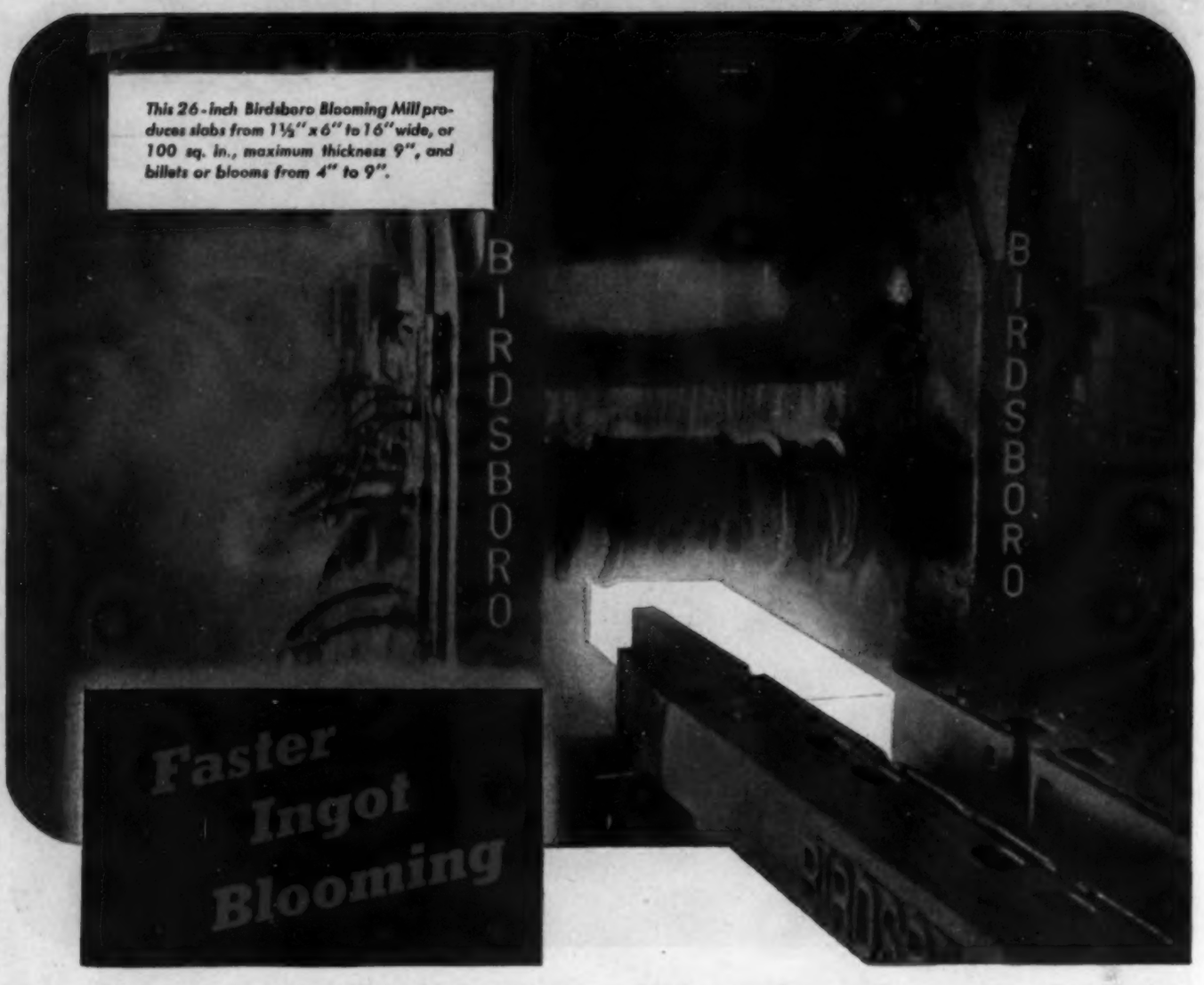
The story of the amplidyne is interestingly told in "The Short Circuit That Moves Mountains". This booklet explains how amplidynes are being used to control speed, hold tension, speed up acceleration, provide automatic positioning. It shows why this G-E development has fostered an entirely new concept of automatic control. Ask for Bulletin GEA-4053. *General Electric Company, Schenectady, N. Y.*

With an electronic tube amplifying a .01 watt signal 100 times, and with the amplidyne in turn boosting it on up 10,000 times, amplification up to 1,000,000 to 1 is possible. If multi-stage electronic amplifiers are used and if the amplidyne is used to control a generator, over-all amplification (from the signal to the generator output) is way up in the billions.

GENERAL ELECTRIC

AMPLIDYNES

The best investment in the world is in your country's future—BUY WAR BONDS


This 26-inch Birdsboro Blooming Mill produces slabs from 1½" x 6" to 16" wide, or 100 sq. in., maximum thickness 9", and billets or blooms from 4" to 9".
BIRDSBORO
BIRDSBORO
Faster Ingot Blooming

with Birdsboro Rapid Two-High Reversing Blooming Mill . . .

for blooming ingots of mild, tool, non-corrosive, automotive, aircraft and special purpose steel

to square, round and rectangular blooms and slabs

with the proper reductions required by the various grades of metals

within time limits the rolling temperatures permit.

Special features of this Birdsboro Rolling Mill — quick reversing, fast screw-down and rapid manipulation — provide the exceptional speed that is demanded by war-pressed production. Yet their low installation cost, low maintenance cost and low power consumption assure the economy that will be needed after Victory is achieved.

If yours is a rolling problem — of either the present or future — it will pay you to consult Birdsboro.

BIRDSBORO STEEL FOUNDRY AND MACHINE COMPANY, Birdsboro, Pa.

BIRDSBORO
STEEL MILL EQUIPMENT

BOUNCE, BALLS, BOUNCE!

2 (Synthetic) 5 (Synthetic) 1 (Natural) 3 (Synthetic) 6 (Synthetic) 4 (Synthetic)

SIX SOLID BALLS OF RUBBER caught in the act of bouncing by a high-speed camera that shoots at the speed of 1/6592 of a second. All of them were dropped from exactly the same height...and yet, what a difference there is! One of the balls is made of a compound containing natural rubber. Each of the other five balls contains one of the five major types of synthetic rubber.

Can you pick out which of the balls is made of the rubber used in making Army barrage balloons? Which rubber is being used today for making tires for military and essential civilian cars? Which one is used for bullet-sealing gasoline hose? Which for insulating tape? Which for making lacquer hose? Try your skill. You will find the answers to these questions in the box at the bottom of this page.

SYNTHETIC RUBBER IS NOT JUST ONE NEW KIND OF RUBBER

It is a whole family of new materials each with its own important uses

Bounce the balls as much as you please. One bounces high. One bounces low. One bounces in between. Which one is best? Actually, there is no one "best kind" of rubber for every purpose. Without all of these main types of synthetic and natural rubber, it would be impossible to beat our enemies and bring our victorious men home as swiftly as possible.

The rubber industry, the chemical and petroleum industries, the Government, working as a team, have made this achievement possible. By pooling all their experience with synthetic rubber, their resources, their skill, they have broken the threat of "rubber shortage" the Axis counted on to throw us out of the war. More than that, they have produced types of synthetic rubber that can do special jobs better than they have ever been done before... and for all time declared our independence from any future cut-off of the nation's rubber supply.

That is the true meaning of the synthetic rubber program. We are proud to have contributed our experience and our resources to doing this job... and doing it in record-breaking, history-making time.

What the future holds for synthetic rubber is not yet fully known. Yet this much is certain. When the war is won, the knowledge we are gaining every day through the use of all these synthetic rubbers, alone and with natural rubber, will make peacetime products... whether tires for your car, belts for your factory, waterproof footwear for your children, or gasoline hose for your service station...better and more serviceable than they have ever been before.

THEY MAY LOOK LIKE "SIX OF A KIND" BUT HERE ARE THE ANSWERS TO THE WAR JOBS EACH ONE CAN DO

1. This ball was made with natural rubber...today used in limited quantities in combination with synthetics because of our small reserve stock.

2. Used for tires, conveyor belts, fire hose and many other products. It is most like natural rubber and can be quickly and efficiently processed.

3. Used for making solvent and lacquer hose and other products where the utmost resistance to solvents is needed...better than natural rubber for these purposes.

4. Used for making bullet-sealing fuel hose for planes and for other uses where high resistance to aromatic fuels is essential.

5. Used for coating barrage balloons, tank linings, packings, acid hose, wires and cables. This type does not support combustion and is highly resistant to sunlight and chemicals.

6. Used for insulating tape, molded parts. It is soft, pliable and odorless.

Listen to United States Rubber Company program, featuring New York Philharmonic Symphony Orchestra, Carl Van Doren, and a guest star, broadcast over Columbia network every Sunday afternoon 3:00 to 4:30 P. M. Eastern War Time

1230 Sixth Avenue • Rockefeller Center • New York 20, N. Y.

THE NATION'S BIGGEST STOCK PILE OF RUBBER IS STILL THE RUBBER ON OUR CARS AND TRUCKS...CONSERVE YOUR TIRES!

In Canada: Dominion Rubber Company, Ltd.

UNITED STATES RUBBER COMPANY

MALLORY BEARINGS
"Can Take It"

RELIABILITY under brutal punishment is the first essential for aircraft engine bearings. Increasingly, they are called on to withstand greater stresses and fatigues. But Mallory Bearings can—and do—"take it", as the daily performance of thousands of fighter planes and bombers will attest.

To hold up under the terrific pressures imposed by combat conditions, Mallory Bearings must be finished to an accuracy that even a few months ago was considered a laboratory dream. Today, thanks to brilliant engineering progress in machine design, bonding and testing technique, Mallory Bearings and other parts silver-surfaced by the Mallosil Process are rolling off production lines, made with precision accuracy that meets the most exacting requirements.

Mallory Bearings are made by the Mallosil Process . . . the Mallory method of bonding rare metals (such as silver) to base metal backings. The process is applied effectively to both ferrous and non-ferrous metals . . . even when heat treated . . . without affecting their physical properties.

The Mallosil Process makes possible precision production, not only of bearings, bushings, pinion races, gear supports and other aircraft engine parts, but other applications in aircraft manufacture. Collector rings with Mallosil surfacing provide long, efficient service in the control mechanisms of bomber power turrets. Mallosil-processed copper coils, rivets, fuse clips, circuit breakers and relay parts give longer and better performance in electrical and communications devices.

Today, Mallory Bearings and other products improved by the Mallosil Process are given over to War effort. Tomorrow, those products will be available for peace-time development. And Mallory engineers will have a wealth of technique and experience to place at the disposal of every manufacturer who is planning design improvements for high-speed motive units. Consult us.

P. R. MALLORY & CO., Inc., INDIANAPOLIS, INDIANA
Cable Address—PELMALLO

Trademarks Reg. U. S. Pat. Off.—Mallosil, Rectostarter, Vibrapack

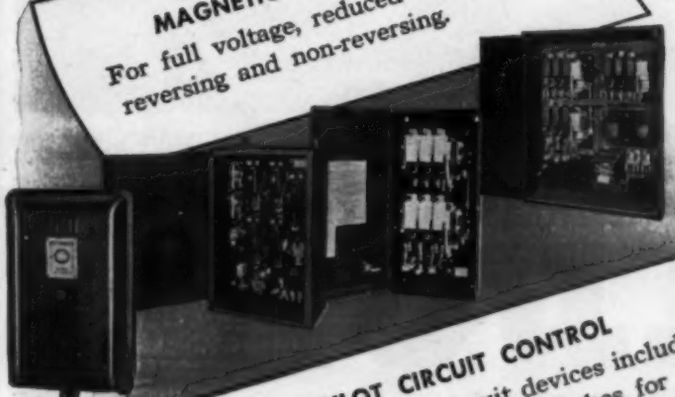
P. R. MALLORY & CO. Inc.
MALLORY

SERVES THE AVIATION, THE AVIATION-INSTRUMENT AND THE AVIATION-COMMUNICATION FIELD WITH WELDING TIPS, THE MALLOSIL PROCESS—BEARINGS, SPECIAL ALLOYS, ELECTRICAL CONTACTS, VIBRATORS, VIBRAPACKS, CONDENSERS, ROTARY AND PUSH BUTTON SWITCHES, ELECTRONIC EQUIPMENT, COMMUNICATIONS HARDWARE, RECTOSTARTERS

and Motor Control shall be designed to:
1. PROVIDE THE GREATEST RELIABILITY FOR TODAY'S HIGH SPEED WAR PRODUCTION...
that's Westinghouse

MANUAL MOTOR CONTROL
For full voltage, reduced voltage, or step starting, speed regulating, reversing and non-reversing.

MAGNETIC MOTOR STARTERS
For full voltage, reduced voltage, step, reversing and non-reversing.



PILOT CIRCUIT CONTROL
All types of Pilot circuit devices including push buttons and limit switches for both standard and heavy-duty service.

Design features like the Westinghouse "De-ion" principle of arc extinction are certainly a common-sense "must". And today's production goals need the kind of protection that the Bi-metal overload relay can give. The Westinghouse line of a-c and d-c motor controls is complete for motor types that meet requirements of a wide variety of applications.

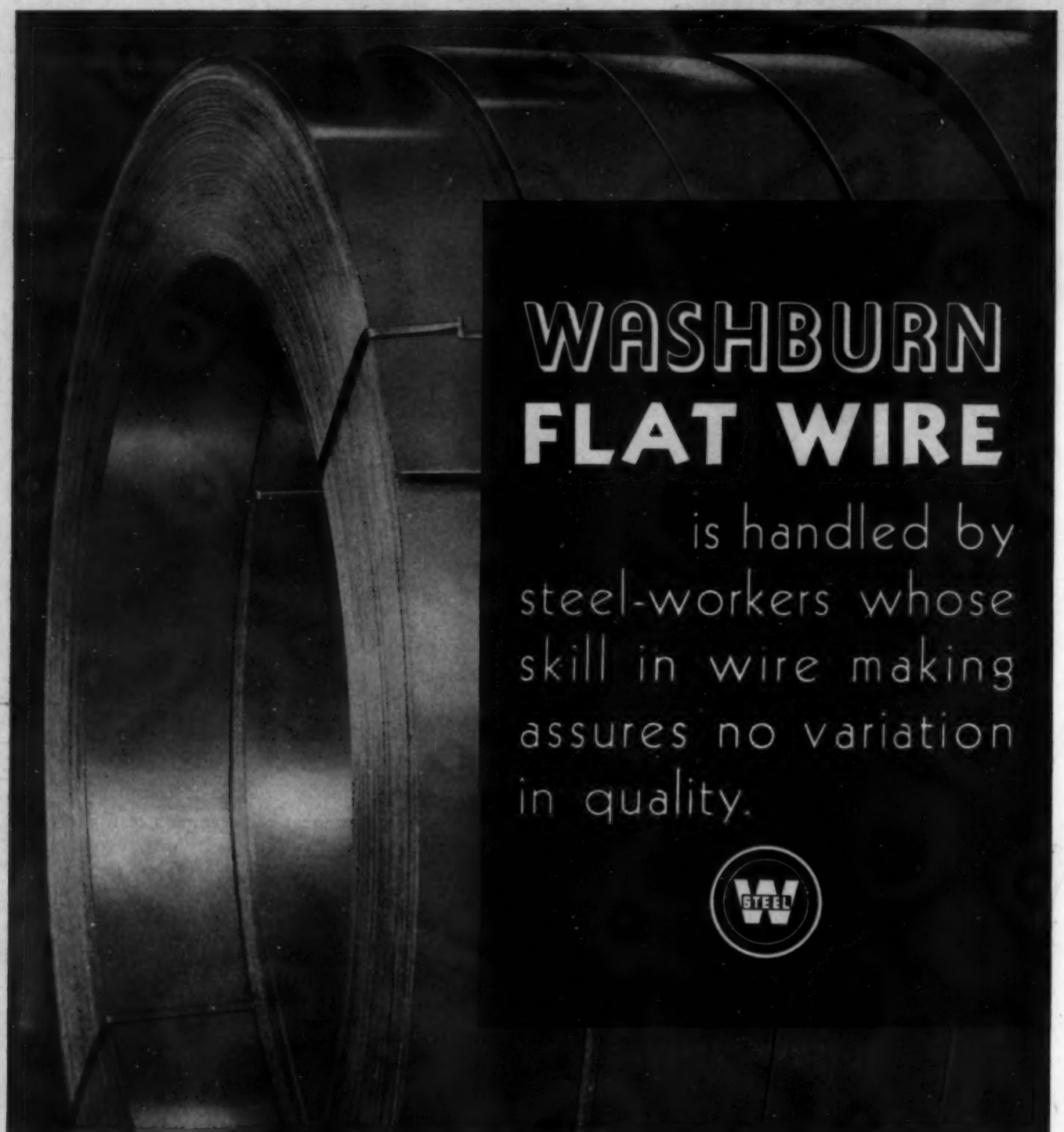
So when you need motor controls—write "Westinghouse" in the specifications. Then get your Westinghouse representative on the phone. He'll help you all the way from application to installation. Westinghouse Electric & Manufacturing Company, East Pittsburgh, Pa., Dept. 7-N.

J-21270

Westinghouse

PLANTS IN 25 CITIES... OFFICES EVERYWHERE

MOTORS AND CONTROLS



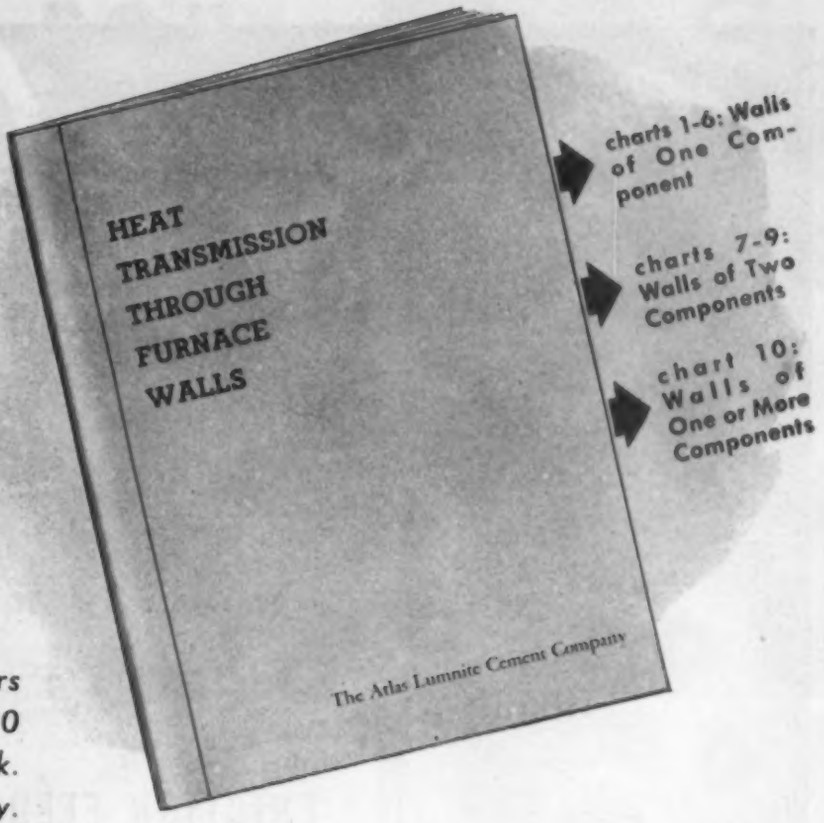
WASHBURN WIRE CO. NEW YORK CITY

WASHBURN

CLEAN, UNIFORM BILLETS - STRIP - RECTANGULAR, ROUND, FLAT RODS
TEMPERED AND UNTEMPERED FLAT AND ROUND HIGH CARBON WIRES

NEW!

charts to simplify heat calculations



Furnace designers and operators can save time by using the 10 full-page charts in this new book. Send coupon for your free copy.

Just off the presses: a 16-page book of charts for rapid calculation of cold-face temperature and heat loss and for selection of efficient refractory and insulating materials. It contains useful information on the conductivity of the refractory materials commonly used in industrial furnace construction.

This new book enables the furnace designer to:

1. Determine cold-face temperature and heat loss when hot-face temperature, thickness of wall and conductivities of the materials are known.
2. Select materials and thickness of wall to give desired cold-face temperature or heat loss when hot-face temperature is known.
3. Compare efficiency of two or more materials or combinations of materials.

The 10 charts give data for walls of two or more components as well as for walls constructed with a single refractory material. The curves are plotted in terms of conductivity factors (K), and can he used in designing for most refractory and high-temperature insulating materials. Calculation of curves was based on A.S.T.M. "Recommended Procedure for Calculating Heat Loss through Furnace Walls." A chart of K-factors for several types of refractories is included.

Fill out and mail the coupon now for your *free* copy of "Heat Transmission Through Furnace Walls."

THIRD WAR LOAN IS ON
Back the Attack with War Bonds!

LUMNITE
FOR
REFRACTORY CONCRETE

The Atlas LUMNITE Cement Company
(United States Steel Corp. Subsidiary)
Dept. S. Chrysler Building
New York 17, New York

Send me copy of "Heat Transmission Through Furnace Walls."

Name_____

Company_____

Address_____

It's New... Logan

QUICK CHANGE GEAR LATHE

with

FRICTION FEED AUTOMATIC APRON

Precision Built FOR SUSTAINED ACCURACY

The variety of work it handles... the speed, accuracy, and safety of its operation place this new lathe in a class by itself. It combines compactness, economy and versatility. With its friction feed automatic apron and precise construction throughout, this new Logan Quick Change Gear Lathe is by every standard a rugged, highly adaptable machine of sustained accuracy. Bed ways, for example, are precision ground to within .001" of absolute accuracy. Total run out of the headstock spindle 12 inches from the bearing is less than .001". The lead screw is held to within .002" in 12 inches. All moving parts are protected by ball bearings or by self-lubricating bronze bearings. As for economy, the new Logan No. 820 quickly pays for itself through lowered unit costs.

LOGAN ENGINEERING COMPANY · Chicago, Illinois

Brief Facts

- Swing over bed 10½"
- Bed length 43⅛"
- Spindle hole 25/32"
- Precision ground ways: 2 prismatic "V" ways; 2 flat ways
- 12 spindle speeds—30 to 1450 per minute
- Worm drive from lead screw spindle for power feeds
- Friction clutch on power feeds
- Longitudinal feed .0015 to .1000" per spindle revolution
- Cross feed .25 times longitudinal feed
- Half nut drive from lead screw thread for thread cutting

Threads—48 selections RH or LH—4 to 224 per inch

Logan

A NAME TO REMEMBER WHEN YOU THINK OF LATHES

WEAPONS FOR PRODUCTION...

Carborundum Brand Products

IT really does not take much imagination to understand the tremendously important part that abrasive and refractory products by Carborundum are playing in the war effort.

For instance, there isn't a single implement of warfare, from the big guns of the battle wagons to the optical lenses of range finders, that does not require grinding at some stage in its production.

Cranks for Diesel engines as well as all of the extremely accurate parts of the airplane engine, the truck and jeep motors, must be ground. Shells and projectiles just couldn't be produced with speed and accuracy without grinding.

The grinding wheel and grinding methods help to make possible the mass production of tanks, ships, machine guns, rifles and the millions of castings and parts that go to make up the machines of war.

The cutting action of milling cutters, reamers, drills, broaches, hobs, taps, dies and other metal fabricating tools depends upon their being properly, skillfully ground.

The castings and other parts of thousands of machine tools must be ground and miles upon miles of coated abrasive products are necessary in the finishing and polishing of all types of metals.

Super refractory products by Carborundum are also doing their part in making possible the more efficient operation of heat treating, ceramic and boiler furnaces and also hundreds of chemical and metallurgical processes.

These products are "Weapons for Production". Use them wisely to conserve strategic materials and thus hasten the Day of Victory.

CARBORUNDUM
ABRASIVE PRODUCTS

CARBORUNDUM
PRODUCTS

THE CARBORUNDUM COMPANY, NIAGARA FALLS, N. Y.
REG. U. S. PAT. OFF.

MANUFACTURERS OF GRINDING WHEELS, COATED ABRASIVES, SUPER REFRACTORIES, HEATING ELEMENTS

Sales Offices and Warehouses in New York, Chicago, Philadelphia, Detroit, Cleveland, Boston, Pittsburgh, Cincinnati, Grand Rapids

(Carborundum is a registered trade-mark of and indicates manufacture by The Carborundum Company)

Of Course We Have It!

U. S. Navy Official Photos

THAT NEW AMMUNITION PRIMER (U. S. Ordnance Dept. "Spec" AXS-946) for Steel Shells, Bombs and Cartridge Cases

Meets every requirement—yours and Uncle Sam's. Top speed and economy in the finishing department, full surface protection to the ammunition. The chances for corrosion to mar the effectiveness of our calling cards for Hitler and Tojo are greatly reduced when they're finished with EGYPTIAN Primer AXS-946 and top coated with EGYPTIAN enamel,—lacquer or synthetic.

This red EGYPTIAN priming coat developed to meet "Spec" AXS-946 may be applied to the bare metal by spray, brush or dip. When applied by spray it air dries in ten minutes for handling and top coating with enamel. If desired it may be baked for ten minutes at 250°F.

You can depend on EGYPTIAN alertness to meet new and revised Government Specifications, just as you can depend on the quality of every EGYPTIAN FINISH.

Send for Revised "Spec" Book S

THE EGYPTIAN LACQUER MANUFACTURING CO.
ROCKEFELLER CENTER—NEW YORK 20, N. Y.

EGYPTIAN FINISHES

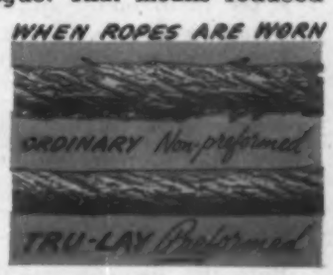
EGYPTIAN Superior FINISHES

30% OF ALL INDUSTRIAL ACCIDENTS ARE TO HANDS AND FINGERS

According to the National Safety Council, 30% of all time-out, industrial accidents are to fingers and hands. 20% of these accidents result in infections. And a workman who has lost his hand through infection is just as incapacitated as if he had lost it in a punch press or buzz saw.

We hope you have never had a lost-time accident due to wire rope. Some operators have, however, and 1943 is no time to have workmen laid up with blood-poisoned hands. Many operators have drastically reduced accidents (and compensation claims) by adopting American Cable TRU-LAY Preformed—the safer rope.

Being preformed, American Cable TRU-LAY is tractable—flexible—easy to handle. It resists kinking and snarling. Worn or broken crown wires lie flat and in place—refusing to wicker out to puncture hands or tear clothing...Furthermore, being preformed, TRU-LAY will last longer than ordinary cable. It has far greater resistance to bending fatigue. That means reduced machine shutdowns for replacement—steadier production — greater dollar value. . . . All American Cable ropes identified by the Emerald strand are made of Improved Plow Steel.



AMERICAN CABLE DIVISION

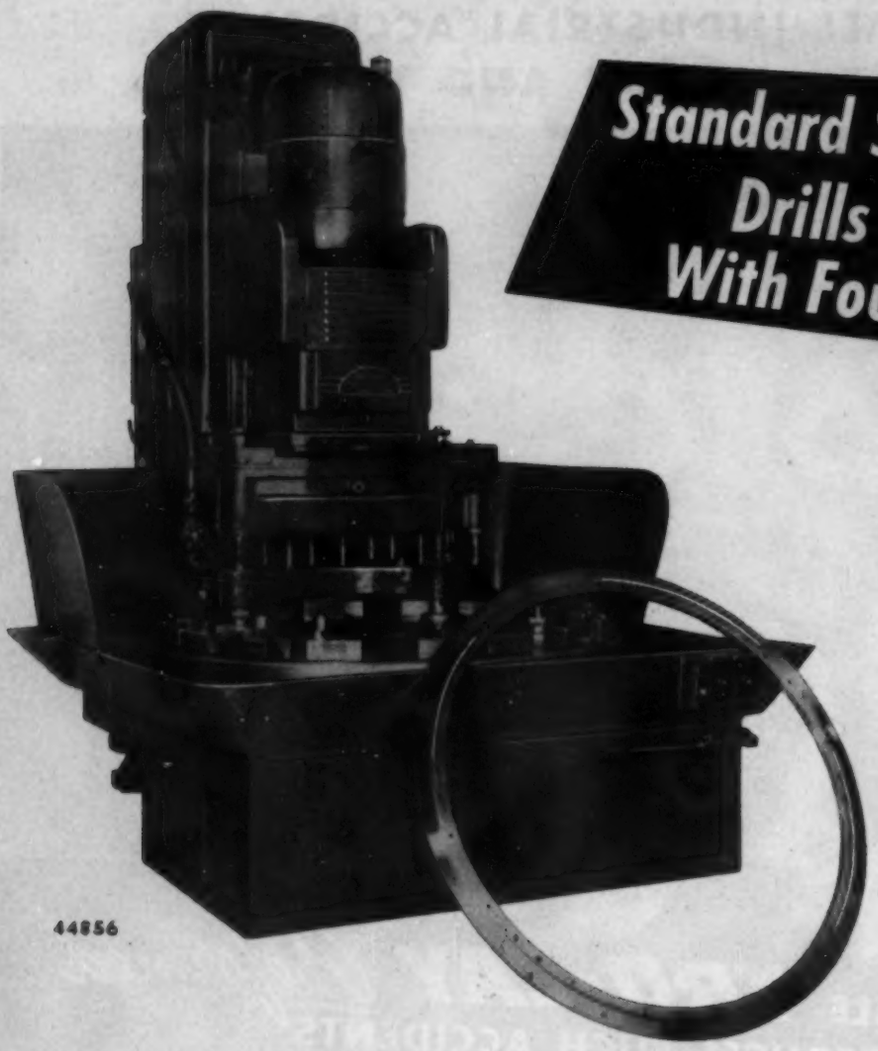
Wilkes-Barre, Pa., Atlanta, Chicago, Detroit, Denver, Los Angeles, New York, Philadelphia, Pittsburgh, Houston, San Francisco, Tacoma

AMERICAN CHAIN & CABLE COMPANY, Inc.

BRIDGEPORT • CONNECTICUT

ESSENTIAL PRODUCTS . . . TRU-LAY Aircraft, Automotive, and Industrial Controls, TRU-LOC Aircraft Terminals, AMERICAN CABLE Wire Rope, TRU-STOP Brakes, AMERICAN Chain, WEED Tire Chains, ACCO Malleable Castings, CAMPBELL Cutting Machines, FORD Hoists, Trolleys, HAZARD Wire Rope, Yacht Rigging, MANLEY Auto Service Equipment, OWEN Springs, PAGE Fence, Shaped Wire, Welding Wire, READING-PRATT & CADY Valves, READING Electric Steel Castings, WRIGHT Hoists, Cranes, Presses . . . *In Business for Your Safety*

Standard Snyder Machine Drills 56 Holes With Four Indexes



IN this operation, a standard Snyder 20 V 16 Hydraulic Drilling and Boring Machine is used to drill 56 holes in a large diameter locating ring which is a tank destroyer part.

The machine is equipped with a 14 spindle multiple head which completes the 56 holes after four indexes. The manually operated index table is 60" in diameter and carries the locating and clamping details. Because of the large size of the index table, a large sub-base is employed which also serves as a chip trough.

This is an example of the many ways in which Snyder standard machines with special equipment are being used to perform operations which are beyond the scope of standard machines with standard equipment.

Both the machine and the large index table are well adapted to other work and can be readily retooled to perform a wide variety of post-war operations with equal speed, efficiency and economy.

Because only the equipment is special, retooling for special type operations can be accomplished at relatively low cost. And, with such equipment, this machine is the equivalent of a special machine—at a saving of about half the special machine price.

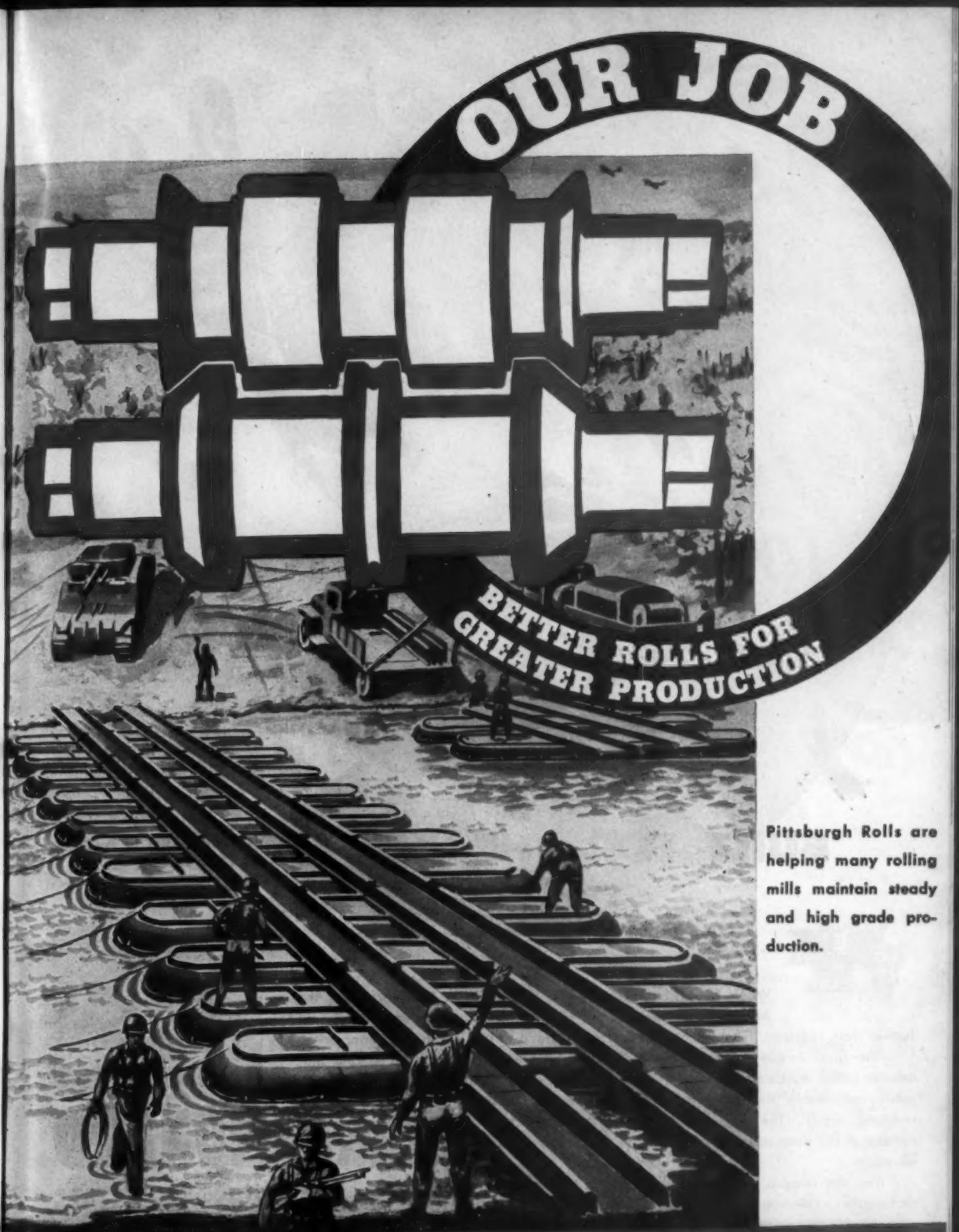
In planning today's production, think of the economy of ready convertibility to various post-war needs. Snyder engineers are ready and competent to help you with your long-range planning.

SNYDER TOOL & ENGINEERING COMPANY

3400 East Lafayette — Detroit 7, Michigan

SNYDER

DESIGNERS AND BUILDERS OF MACHINERY FOR HIGH PRODUCTION AT LOW UNIT COST



Pittsburgh Rolls are helping many rolling mills maintain steady and high grade production.

PITTSBURGH ROLLS

PITTSBURGH ROLLS DIVISION of

BLAW-KNOX CO.—"Steel's Partner" • PITTSBURGH, PA.

BUILT FOR THE AIR SERVICE

ARMY E NAVY

ARMY E NAVY

When Ward Leonard developed their B-2A Relay to meet the Army Air Corps tests for vibration and acceleration, they went further than required. They incorporated features in it not found in any other relay.

The layer-wound coils are thoroughly impregnated by a vacuum process that assures better insulation under humid conditions. The tail spring and contact gap are readily adjustable, thus enabling perfect adaptation to the required circuit. The anchorage for the terminal screws molded in the base assures rigidity of the entire relay under vibration.

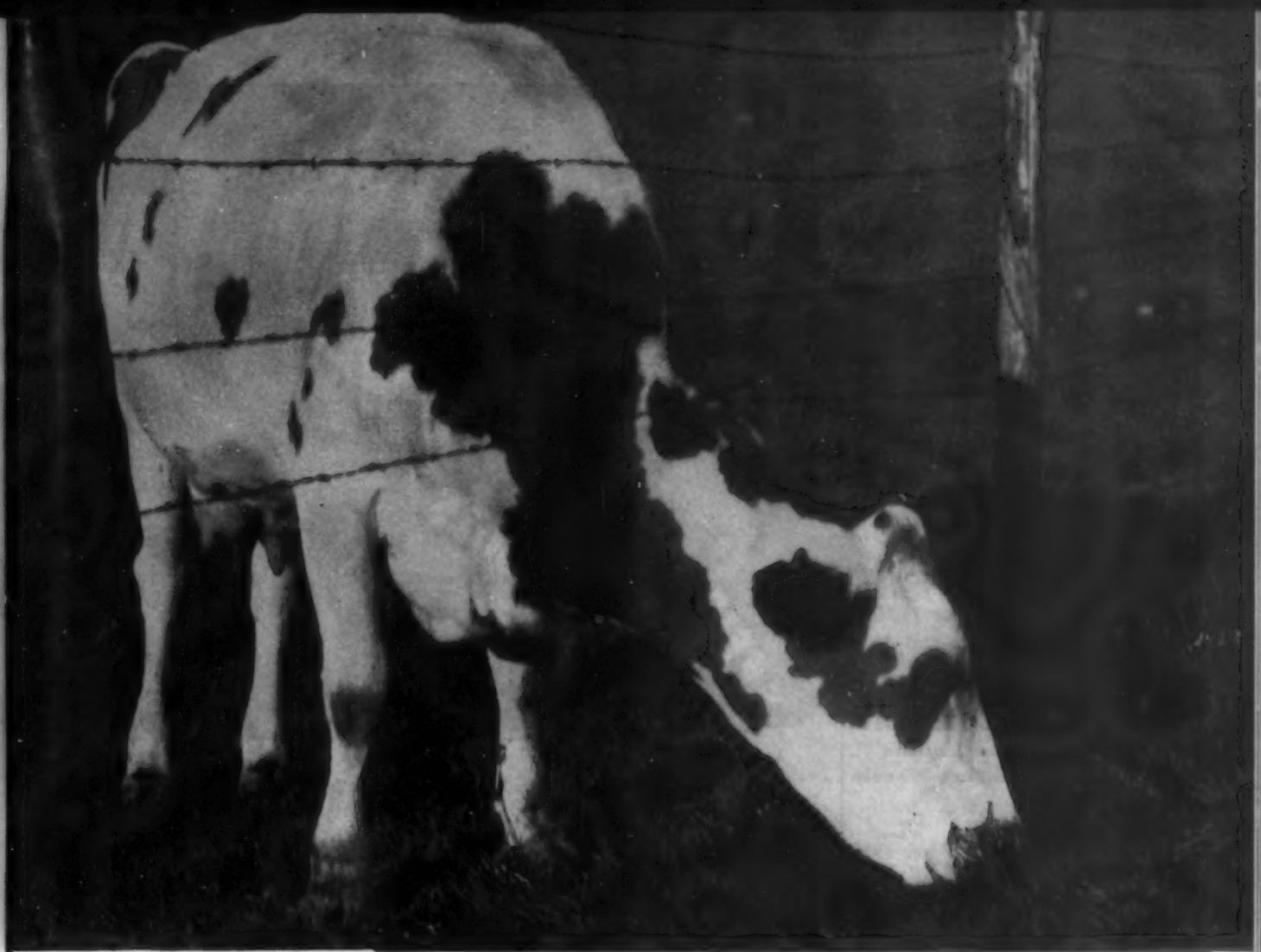
Yes, this relay is used on aircraft, but the very features that make it desirable for airplane use make it equally desirable for any purpose when a rugged, positive, crisp-acting relay is required. Send for bulletin No. 103.

WARD LEONARD

RELAYS • RESISTORS • RHEOSTATS

Electric control (WL) *devices since 1892.*

WARD LEONARD ELECTRIC COMPANY — 65 SOUTH STREET — MOUNT VERNON, NEW YORK



"THE GRASS IS *Always* GREENER . . !"

Need we finish it? . . . "on the other side of the fence."

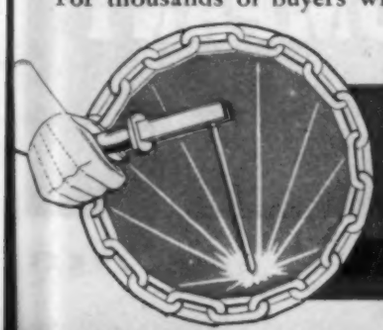
Here at The McKay Company we have no illusions about the very human tendency of most individuals to "shop around" a little in their quest for something better. And because of that deeply ingrained habit The McKay Company and the McKay line of products has grown in importance and reputation and usefulness.

For thousands of buyers who came to "nibble" have stayed to "graze" . . and other thousands, tempted elsewhere for awhile, have returned to the safe, dependable source of recurring satisfactory supply.

If it's stainless or mild steel Welding Electrodes or Commercial Chain you need (Tire Chains, too, although they may not be in your line), the reputation of these McKay products is sustained by 60 years of dependable service to industry

Try them sometime!

Sales Offices: York, Pa.



THE McKAY COMPANY
PITTSBURGH, PA.

WELDING ELECTRODES . . . COMMERCIAL CHAINS . . . TIRE CHAINS

ABRASIVE COMPANY

Standard Specifications

Tool Room Grinding Wheels

Job	*Standard Wheel*	*No. 18 Density Wheel**
Broaches	W60 -J-KY	W60- J-N18
Cutters	W46-K-HY	W60-L-P18
Die Blocks	W46-G-KY	W60-H-L18
Drills—		
Small	60-M-DY	
Large	36-M-DY	
Gears	W60- J-K8	W80-L-P18
Hobs	W60- J-K9	W80- J-N18
Machine Shops—General Offhand	46-M-DY	
Reamers	W46- J-HY	W60- J-N18
Stellite Cutters	W46- J-HY	W60- J-N18
Tools—Lathe and Planer		
Light Offhand	46-M-DY	
Heavy Offhand	46-N-D9	
Heavy—Large Wheels	30-O-D9	
Fixture Grinding	W46- J-HY	W60- J-N18
Tungsten Carbide Tools—Offhand		
Roughing	G601- I-V9	
Semi-Finishing	G80-H-V8	
Finishing	G120-H-V8	

*No. 18 Density—Open, Porous Wheel with wide grain spacing.

For Best Results Follow These Suggestions

1 Sharpen tools and cutters frequently

The waste of critical alloy steel resulting from infrequent regrinding is enormous because so much of the tool has to be ground away to renew the cutting edge.

2 Dress and true the grinding wheel

Dress frequently enough to retain correct wheel shape and to keep the abrasive cutting particles clean and exposed for most efficient grinding action. Excessive dressing, however, wastes the grinding wheel.

3 Use the best grain and grade of wheel for your job

ABRASIVE COMPANY "white" and "red" tool room grinding wheels have been standard for many years for all types of tool and cutter grinding. For exceptionally fast and cool grinding action on heat sensitive alloy steels specify the newer "No. 18 Density" wheels with open, wide-spaced porosity.

ABRASIVE COMPANY

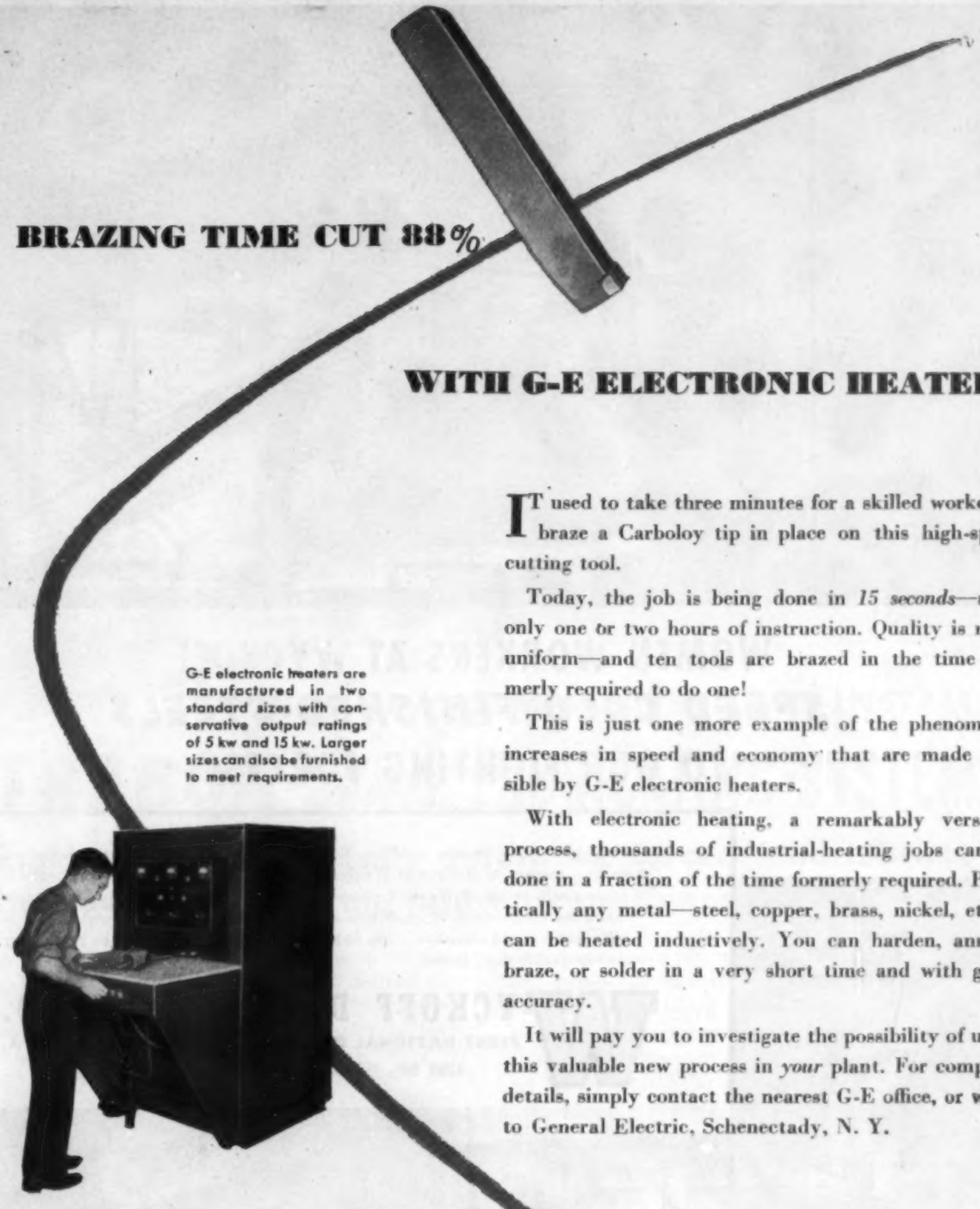
DIVISION OF SIMONDS SAW AND STEEL CO.

TACONY & FRALEY STS., PHILADELPHIA 37, PA.

Distributors in all principal cities

BRAZING TIME CUT 88%

WITH G-E ELECTRONIC HEATERS



G-E electronic heaters are manufactured in two standard sizes with conservative output ratings of 5 kw and 15 kw. Larger sizes can also be furnished to meet requirements.

IT used to take three minutes for a skilled worker to braze a Carboloy tip in place on this high-speed cutting tool.

Today, the job is being done in *15 seconds*—after only one or two hours of instruction. Quality is more uniform—and ten tools are brazed in the time formerly required to do one!

This is just one more example of the phenomenal increases in speed and economy that are made possible by G-E electronic heaters.

With electronic heating, a remarkably versatile process, thousands of industrial-heating jobs can be done in a fraction of the time formerly required. Practically any metal—steel, copper, brass, nickel, etc.—can be heated inductively. You can harden, anneal, braze, or solder in a very short time and with great accuracy.

It will pay you to investigate the possibility of using this valuable new process in *your* plant. For complete details, simply contact the nearest G-E office, or write to General Electric, Schenectady, N. Y.

● ***Electronic heating is a new and powerful tool to help speed American War production. Like most new tools, it can easily be misapplied. The recommendations of G-E Industrial Heating Specialists are based on the experience gained with more than two hundred installations of electronic heaters, plus a quarter century of experience in the development, manufacture, and application of electric heating equipment of all types.***

GENERAL ELECTRIC

673-87-8709

ELECTRONIC HEATERS

The best investment in the world is in this country's future.
BUY WAR BONDS

WOMEN WORKERS AT WYCKOFF
SPEED COLD FINISHED STEELS
TO OUR FIGHTING FORCES

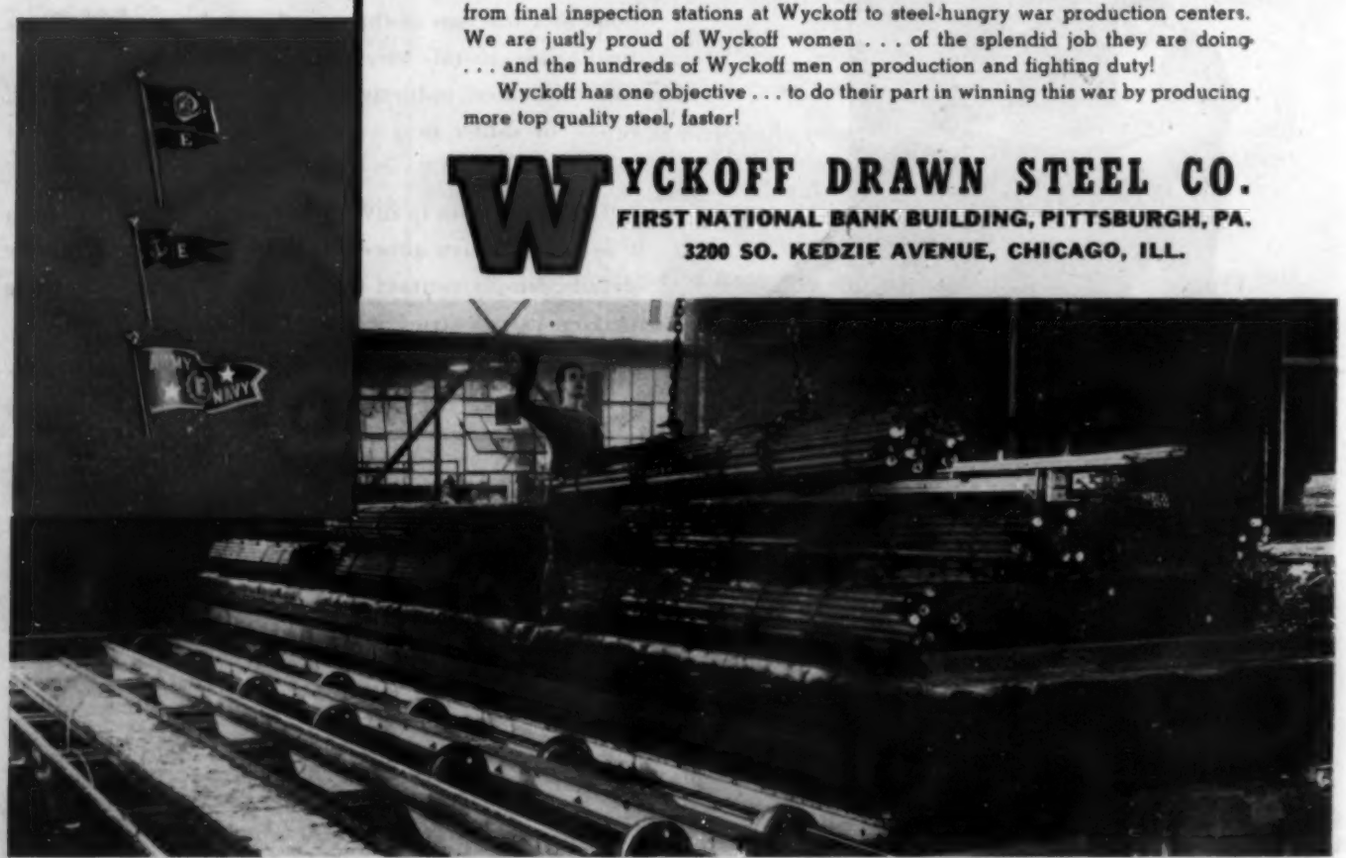
Carbon and Alloy Steels—shafting, flats and other essential forms are rushed from final inspection stations at Wyckoff to steel-hungry war production centers. We are justly proud of Wyckoff women . . . of the splendid job they are doing . . . and the hundreds of Wyckoff men on production and fighting duty!

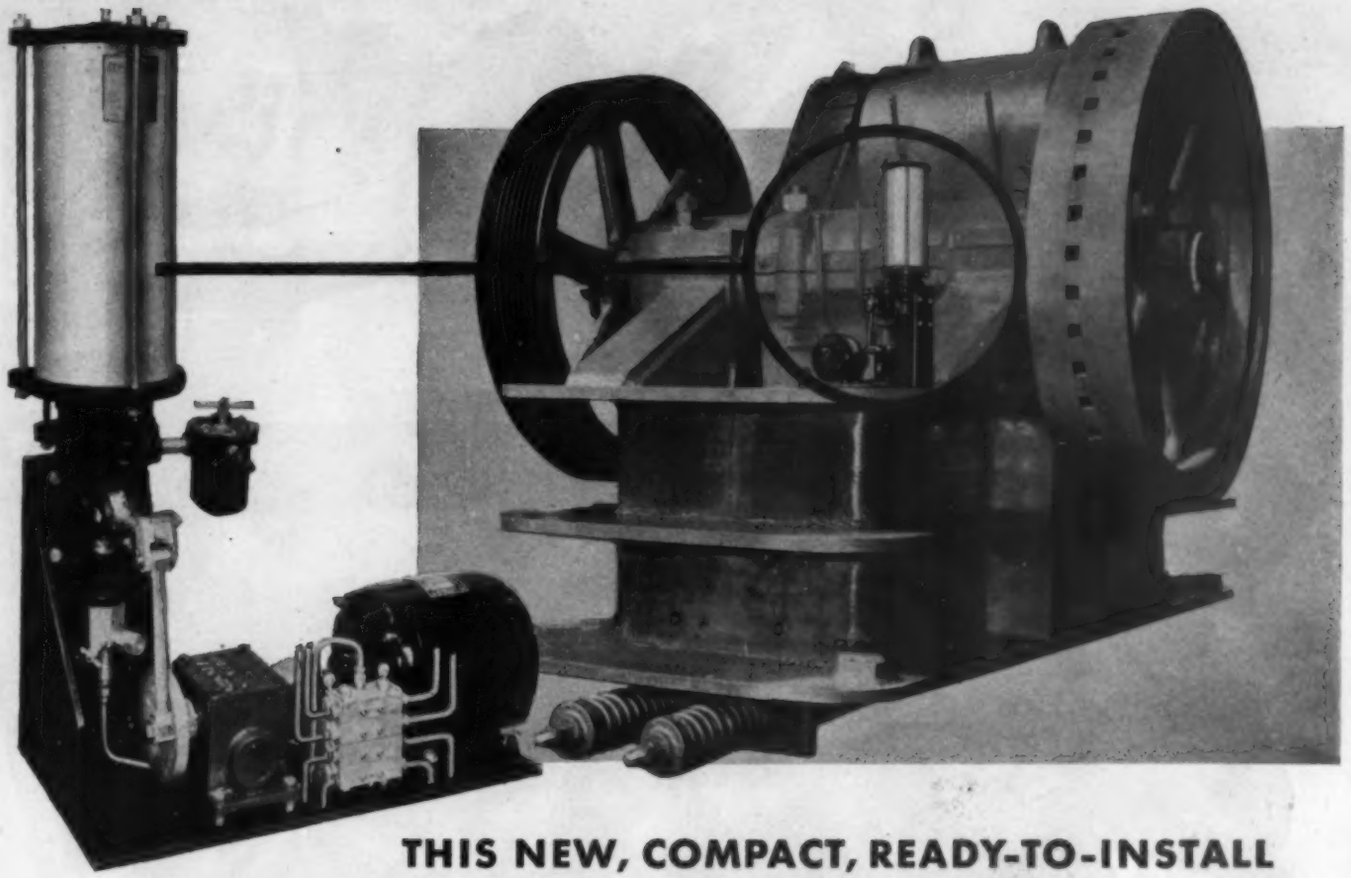
Wyckoff has one objective . . . to do their part in winning this war by producing more top quality steel, faster!

WYCKOFF DRAWN STEEL CO.

FIRST NATIONAL BANK BUILDING, PITTSBURGH, PA.

3200 SO. KEDZIE AVENUE, CHICAGO, ILL.





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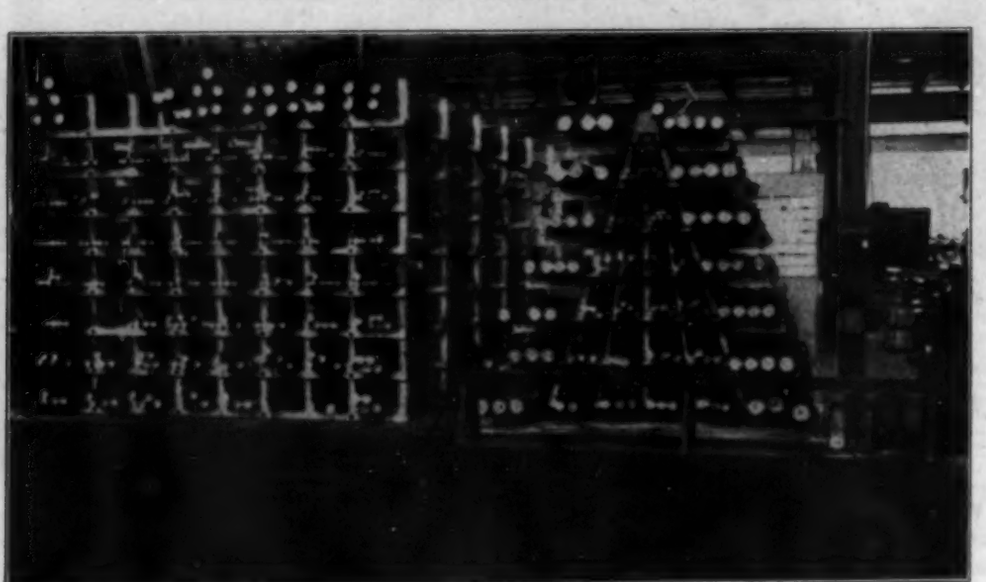

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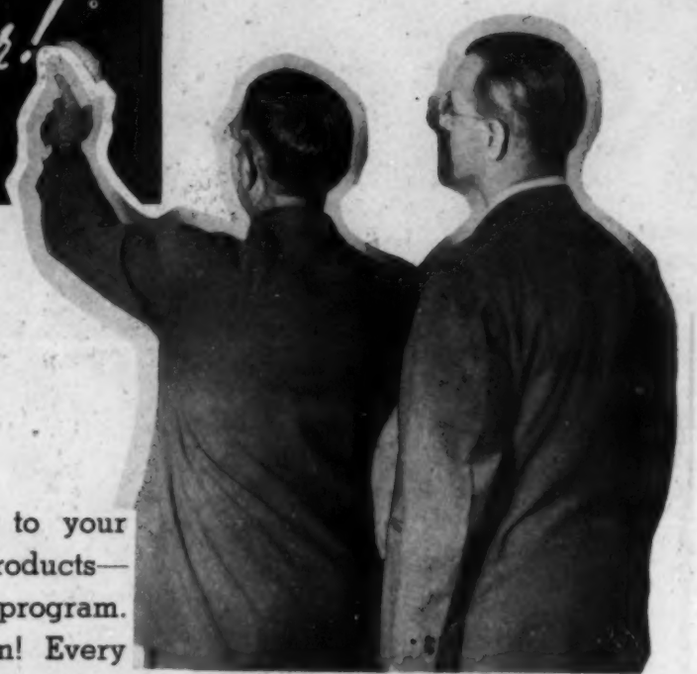

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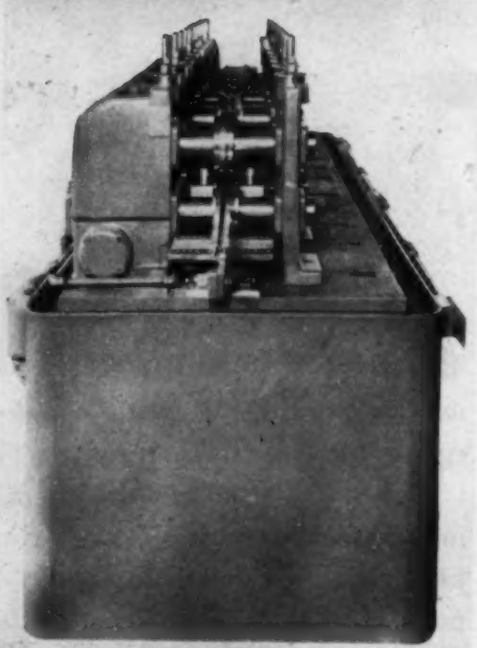

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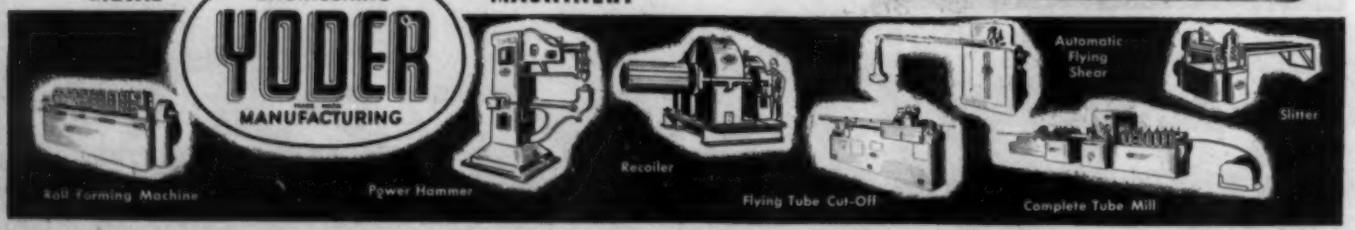

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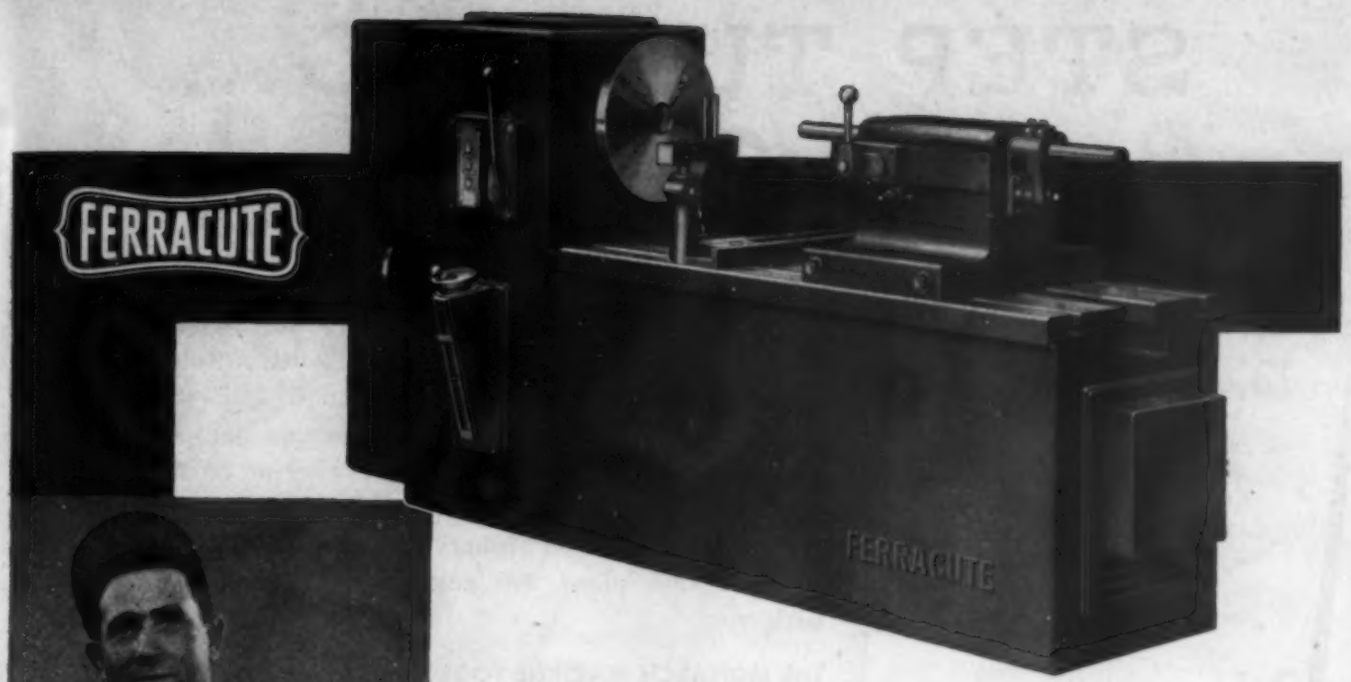

WITH SKILLED MEN AT A PREMIUM . . .

Make the most of what you have

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SIMPLER—FASTER—REQUIRES LESS EFFORT

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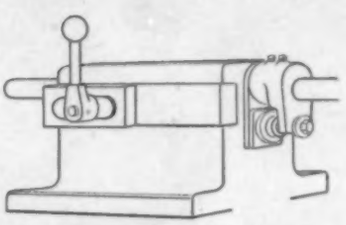
Trimming
Wiring
Beading

In keeping with the Ferracute tradition of plus-age in strength and weight, the frame of Spinning Lathe 224 is of cast iron, rugged construction of ample weight to guard against vibration when rotating work at highest speeds.



SINGLE LEVER CONTROL

Air-operated tailstock spindle

One spindle-operating lever, conveniently located for right-hand control, is moved toward the work and the spindle travels forward. Further movement, in the same direction, locks the spindle firmly against the work. Movement of the lever away from the work unclasps the spindle and causes it to withdraw.

VARIABLE SPEED CONTROL

Built-in Motor

Motor has 2 speeds, selected by push-buttons on motor-control panel. To employ any speed between 200 and 600 RPM or between 500 and 1000 RPM, operator rotates the speed-adjusting handwheel. Higher speeds are available. Speed, indicated by graduated gauge, may be varied while lathe is running.

INSTANTANEOUS START AND STOP

Single lever control of clutch and brake

With the motor running, a pull of the control lever engages a dry-disc clutch—and the spindle immediately comes up to speed. A short movement of same lever to left engages brake to bring spindle to rest instantaneously. No drag—no drift.

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Bulletin giving full specifications now available. Deliveries on Ferracute Spinning Lathe No. 224 can be scheduled now. Consult us concerning practical and economical applications of this machine.

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STEP TURNING...

3 times as fast!

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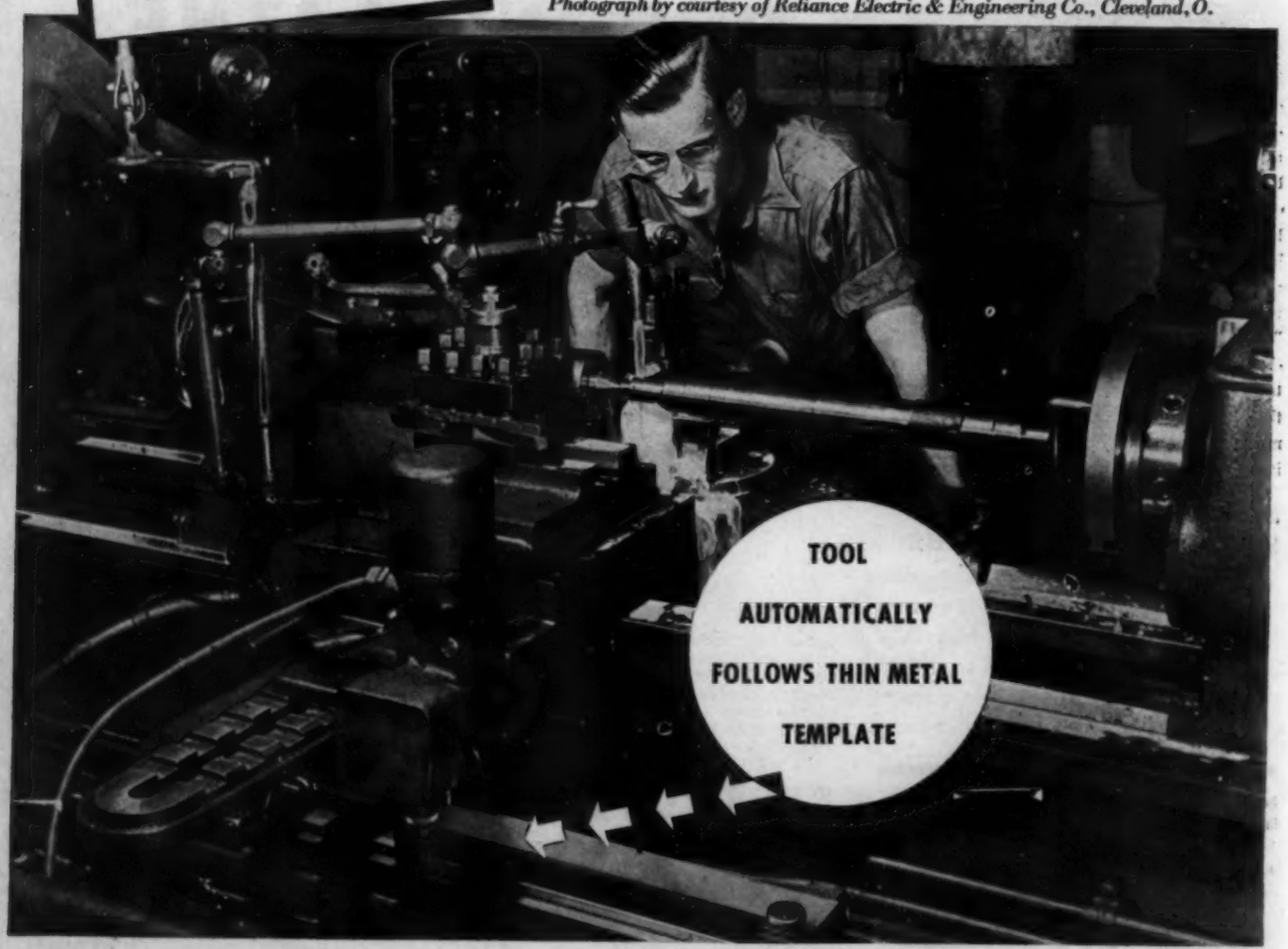
Lathe Size 18 x 48 BB- Automatic Sizing
Customer Reliance Elect. & Eng. Co.
Part Name Shaft
Material S.A.E. 1045
Heat Treat None
Operation Turn for grinding- Leave .020 Grind Stock
R. P. M. 420
Surf. Speed 275
Feed .015
Max. Depth of Cut 1/4"
Type Cutting Tool Carbide tipped
Actual Cutting Time 3.21 Min.
Load Time 4.46 Min.
Approx. Tool Life 55 Min.
Memorandum Foreman reports production 3 times as fast as on manually controlled lathes.

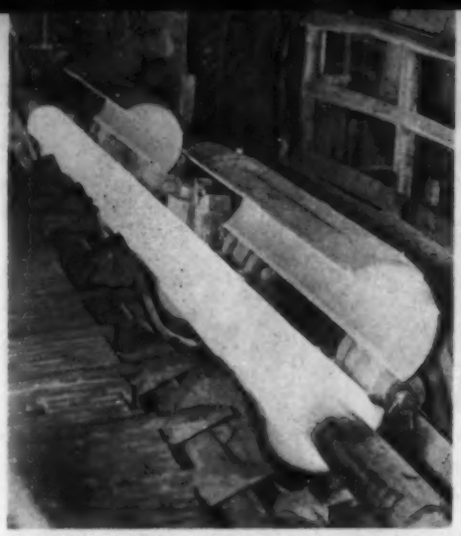
Turning the job illustrated is accomplished three times as fast on Monarch lathes equipped with automatic sizing, as was formerly done on standard lathes with manual control. It is typical of what can be accomplished on such work as turning, boring or facing or combinations of these operations. If you are interested in the application of Monarch's automatic sizing, to work in your plant, our engineers will gladly work with you.

THE MONARCH MACHINE TOOL COMPANY · SIDNEY · OHIO

MONARCH LATHES *Save Time*

Photograph by courtesy of Reliance Electric & Engineering Co., Cleveland, O.





National Tube's first piercing machine works on hot steel billet for "Big Inch." Page 64

STEEL

The Magazine of Metalworking and Metalproducing

SEPTEMBER 13, 1943

Volume 113 *Number 11*

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Published by The Penton Publishing Co., Penton Bldg., Cleveland 13, Ohio. E. L. Shaner, President and Treasurer; G. O. Hays, Vice President; F. G. Steinebach, Secretary.

Member, Audit Bureau of Circulations; Associated Business Papers, Inc., and National Publishers' Association.

Published every Monday. Subscription in the United States and possessions, Canada, Mexico, Cuba, Central and South America, one year $6; two years $10; all other countries, one year $12. Single copies (current issues) 25c.

Entered as second class matter at the postoffice at Cleveland, under the Act of March 3, 1879. Copyright 1943 by the Penton Publishing Co.

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thanks to Graybar's Procurement Know-How!

Reports from the fighting fronts, reaching a builder of one of America's pursuit ships, showed the need for a change in the cockpit lighting fixture, a small item, but one of vital importance in emergencies.

Recalling Graybar's fine record in meeting other difficult lighting problems, the plane-builder asked for our help. It meant developing a brand new unit, tooling up, and beginning quantity shipments in just about 60 days!

From its list of lighting suppliers, GRAYBAR picked a firm with the right background and facilities for this particular job. A design engineer arrived overnight, and "pitched in" with the plane builder's men and the GRAYBAR Lighting Specialist.

Just two weeks later he was back with samples of a new design, a design which met the thorough tests with flying colors. The production order followed immediately. In less than 30 days thereafter, the plant was making deliveries in quantity.

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More and more, GRAYBAR service to builders of war equipment is embracing items to be incorporated in their construction. Whether these are *standard* or *special*, mass-produced or built to order, GRAYBAR offers a fast-acting service of supply, backed by experienced specialists in procurement for aircraft, shipbuilding or ordnance.

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STEEL
September 13, 1943

Destiny Waits on Congress

Members of the seventy-eighth Congress will reassemble Sept. 14, after a summer recess which afforded most of them ample opportunity to consult their constituents. Presumably the legislators go back to their Washington desks with a fair idea of what the home folks think about the way their government is being administered.

Also, they go back to problems of extreme importance. In the opening weeks of this session they will consider renegotiation of contracts, manpower problems and the possibility of a compulsory job allotment law, revision of patent office policies, termination of war contracts, problems of small business, economy in government expenditures, postwar planning, price controls, rationing, drafting of fathers for military service, taxes for individuals and corporations, labor relations problems, food production and distribution, subsidies or similar expedients, and numerous other matters of importance.

In many respects the agenda of Congress is the broadest and the most important in the history of the nation. The decisions of our lawmakers on many of the current issues not only will affect the conduct of the war and the drafting of peace terms, but they also will influence in a considerable degree the character of the nation's postwar economy. The very fact that Italy's unconditional surrender was announced less than a week before Congress reassembled should make every member sharply conscious of the postwar implications of his votes.

The agenda of Congress also is unusual in the extent to which so many of the issues to be debated have a direct bearing upon the future of American industry. High up on the list of legislation scheduled for early consideration are bills which will go a long way toward determining the status of private enterprise during the exciting decade ahead.

In view of the big stake which business has in the deliberations of this Congress, it is somewhat reassuring to reflect that in recent months the major trend in Washington has been definitely toward a better understanding of and a more sympathetic attitude toward the problems of business. The swing in Washington thinking and action has been from left to right.

If, as we firmly believe, this feeling on the part of most congressmen was further strengthened by their recent visits with their constituents, then we may expect legislation which in the main will be more beneficial to private enterprise than were many of the laws of the past decade.

STRAIN BEGINS TO SHOW: As an ex-railroader this writer has a wholesome respect for the superstition that train wrecks occur in series of threes. Following the accident to the Lackawanna Limited on Aug. 31, it was only natural to anticipate two more bad wrecks. The derailment of the Advance Congressional Limited on Sept. 6 was No. 2 and the wreck of the eastbound Twentieth Century Limited on Sept. 7 was No. 3.

Of course, these accidents to famous name limiteds were not the only wrecks during the 8-day periods. Others, less serious, occurred on the Long Island, Erie, Pennsylvania, R. F. & P. and other roads. Scores of minor railroad mishaps occur which do not get front page publicity.

This prevalence of wrecks is not surprising. Considering the speed and volume of traffic, the condition of equipment and the problems of personnel, it is amazing that the roads have not had more disasters.

It now seems certain that in evolving our wartime domestic economy we have cut our allotment of ma-

(OVER)

terials and equipment to the railroads too drastically. We have ridden our luck too far. The roads should have more rails, cars and locomotives and replacement materials and parts immediately. —p. 67

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A STITCH IN TIME . . . : Labor shortages are becoming so serious that the government is taking drastic measures to deal with them. Conditions on the West Coast are acute, especially in San Diego, Los Angeles, San Francisco, Portland and Seattle. It is estimated that 260,000 more workers are needed immediately in the aircraft plants and shipyards in these areas.

Government officials hope to ease the situation by means of the Buffalo plan, which combines controlled hiring with the balancing of production programs with labor supply. In some districts, this proposed remedy almost certainly will entail the moving of some plant operations to other localities.

It is hard to correct a manpower shortage once it has reached an acute stage. By acting promptly, local authorities in some eastern districts may yet avoid the difficulties now faced in the Far West. —p. 66

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SHIFT IN ALLOY STEEL: A curious combination of the factors of supply and demand has caused WPB officials to appeal to the steel industry to shift alloy steel production from open-hearth to electric furnaces so as to release more open-hearth capacity for carbon steel.

The reasons for this request are, first, that electric furnace capacity has been increased so much in the past year that a substantial proportion of the steel of alloy grades now being made in open hearths can be accommodated in the electrics, and secondly, the demand for carbon steel exceeds the supply and the open-hearth capacity released by the shift of alloy steel can be utilized to good effect.

This move is so clearly a step toward a more effective use of facilities that producers and consumers will wish to co-operate as fully as possible. —p. 68

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MORE HARM THAN GOOD: Now that the effect of the Truman committee's indictment of operations of the Wright Aeronautical Corp. plant at Lockland, O., can be viewed in retrospect, it is apparent that the committee's action did more harm than good.

In publicly reflecting upon the ability and integrity of one of the oldest builders of aircraft engines and of the Army Air Force, the committee has forced officials and inspectors in numerous war plants to be super-cautious—or rather, to refuse to take responsibilities which in wartime are necessary if a high rate of production is to be maintained. The net result is that parts are rejected unnecessarily and that output has fallen off appreciably.

The question raised by this episode is not whether or not congressional investigating committees should investigate. Much good can come from investigations properly conducted. The pertinent question is how the committee interprets and utilizes the findings of its investigations. On this score, the Truman committee bungled badly in the Lockland case. —p. 82

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DRILLING SMALL HOLES: A few years ago a young man working in the rayon industry became interested in the problem of drilling small holes in rayon fiber spinerets. He knew that twist drills as small as 0.013 inch in diameter and Swiss drills down to 0.006 inch were obtainable, but he was seeking something of even smaller diameter.

At first, working evenings in his bedroom, he experimented with the making of microscopic drills and other tools. As the work progressed, he moved his equipment to the family garage and engaged the services of two assistants. A year ago, his operations were transferred to a two-story building and his company now is manufacturing drills, reamers, countersinks and other tools of microscopic size on a full-fledged commercial basis.

Right now the chief demand for these tools is for drilling holes in injection nozzles for diesel engines and for machining parts for aircraft instruments. While most of the drills now being made are 0.0065-inch in diameter or larger, it is possible to make drills as small as 0.003-inch.

The availability of drills of microscopic dimensions means much to the war effort. Smaller holes in diesel engine nozzles increase horsepower and conserve fuel. After the war, microscopic tools probably will solve new peacetime machining problems. —p. 98

E. L. Shaner

EDITOR-IN-CHIEF

Longitudinal body seams are securely clamped before resistance welding.

Powder boxes must keep a fighting ship's powder dry.

How the Navy Keeps Its Powder Dry

Stored deep in the holds of Allied fighting ships are water-tight boxes—each containing 100 lbs. of powder. These powder boxes must withstand hard usage, stack easily and keep precious powder in condition for instant use by our fighting men. Thousands have been made of Inland hot-rolled pickled and oiled sheets.

They are of welded construction, and galvanized inside and outside for full protection. The opening in the top is sealed with a gasket drawn tight by a hand screw and spider. The bodies are formed from 16-ga. sheets. Tops and bottoms are made of 13-ga. sheets. The tops are formed in four operations—blank and punch opening, deep draw to 2-¾" and emboss opening, trim corners and roll back edges. The excellent working qualities of Inland sheets help speed production and save time and materials.

When Victory is ours, the modern Inland continuous sheet and strip mills, which now are producing at full capacity for the war effort, will again be making sheet and strip for hundreds of peacetime products.

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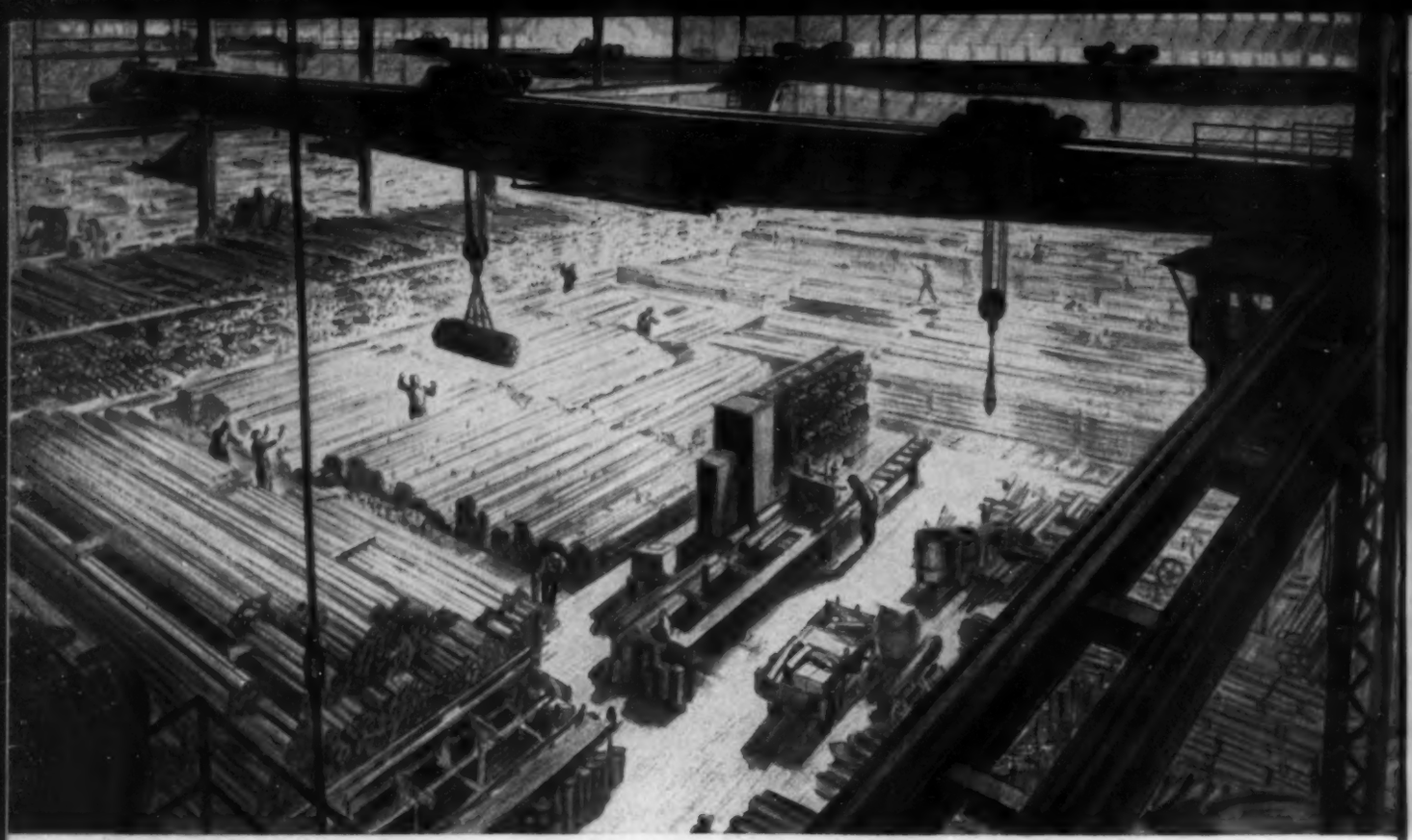

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DRILL PIPE ORDERS DELUGE PRODUCERS

Steel immediately available inadequate for demand. . . Large diameter pipelines helping to solve petroleum transportation problem to East coast. Proving more economical than other overland methods

By R. L. HARTFORD

PITTSBURGH

PRODUCERS of oil country tubular goods are making some headway in classifying the avalanche of orders for drill pipe, casing and drilling accessories which has been placed in the past few weeks.

With the possible exception of one company, all producers are now filled for the fourth quarter. Total shipments for the fourth quarter probably will run about 35 per cent ahead of the third quarter, which period saw the first active shipments of oil country goods since early in 1942.

Under the program of the PAW, which permits one well to be drilled for every 40 acres of oil land, sufficient steel has been allocated to cover fourth quarter schedules of all producers.

Easing of restrictions on drilling activity, which was a by-product of the belated recognition of the desperate situation in the petroleum industry, has resulted in a substantial increase in the number of new wells being drilled.

The new drillings ordinarily would depend on warehouse stocks of pipe and casing in oil country warehouses, or in the case of drilling by larger companies, on their own stocks of such items. However, since the beginning of the war there has been no priority rating assigned on these items which was high

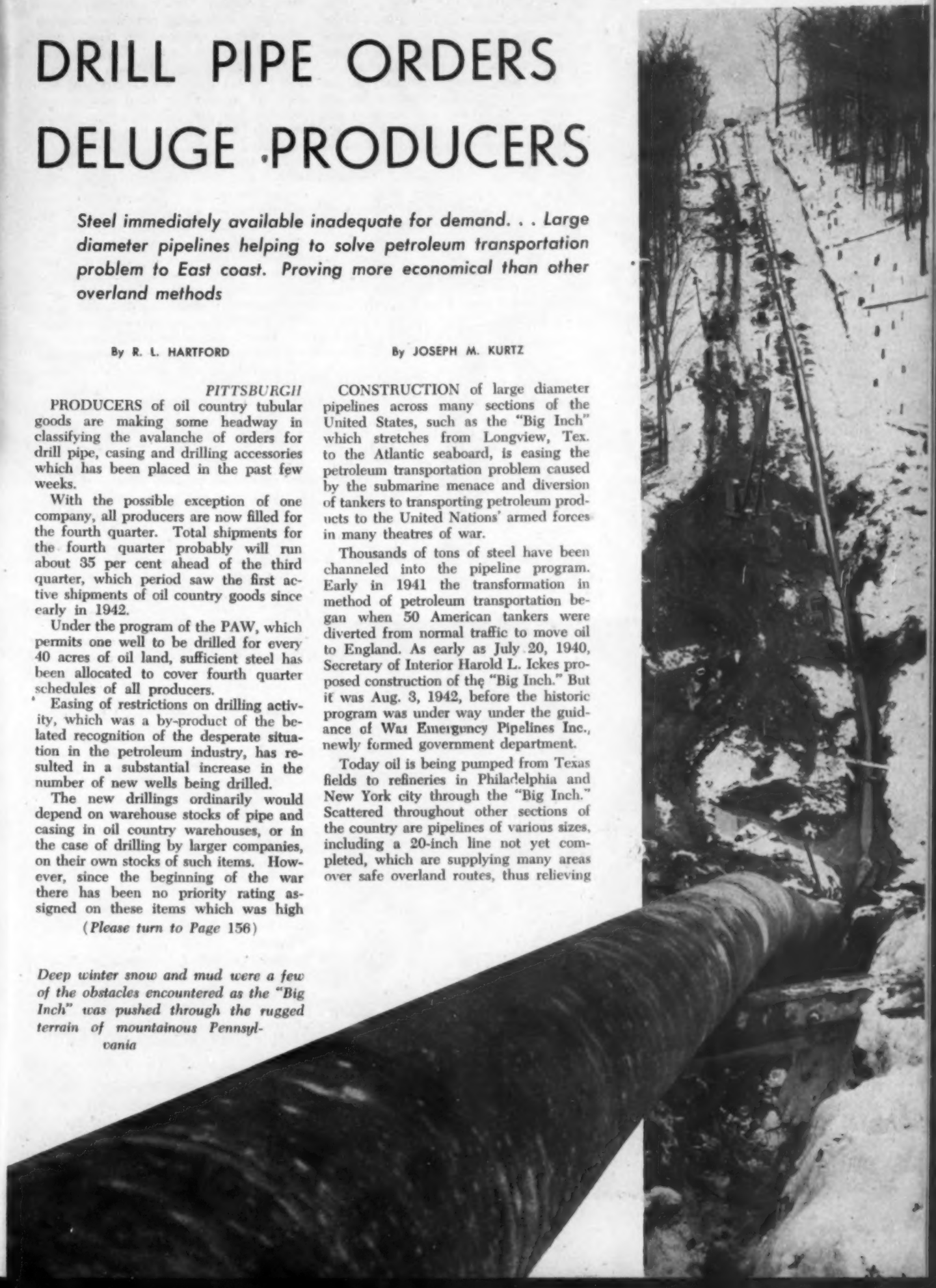
(*Please turn to Page* 156)

By JOSEPH M. KURTZ

CONSTRUCTION of large diameter pipelines across many sections of the United States, such as the "Big Inch" which stretches from Longview, Tex. to the Atlantic seaboard, is easing the petroleum transportation problem caused by the submarine menace and diversion of tankers to transporting petroleum products to the United Nations' armed forces in many theatres of war.

Thousands of tons of steel have been channeled into the pipeline program. Early in 1941 the transformation in method of petroleum transportation began when 50 American tankers were diverted from normal traffic to move oil to England. As early as July 20, 1940, Secretary of Interior Harold L. Ickes proposed construction of the "Big Inch." But it was Aug. 3, 1942, before the historic program was under way under the guidance of War Emergency Pipelines Inc., newly formed government department.

Today oil is being pumped from Texas fields to refineries in Philadelphia and New York city through the "Big Inch." Scattered throughout other sections of the country are pipelines of various sizes, including a 20-inch line not yet completed, which are supplying many areas over safe overland routes, thus relieving



Deep winter snow and mud were a few of the obstacles encountered as the "Big Inch" was pushed through the rugged terrain of mountainous Pennsylvania

more tankers for transoceanic duty.

Soon after Pearl Harbor deliveries of oil and gas to the Atlantic seaboard were cut drastically. The petroleum supply to the East was reduced from an average peacetime rate of 1,400,000 barrels a day to 200,000 barrels. By the end of this year deliveries by pipelines and inland waterways will reach 1,600,000 barrels, exceeding by 200,000 the peacetime movement to the East. And by second quarter of 1944 deliveries are expected to reach 1,800,000 barrels daily.

Importance of the pipeline program is attested by the fact that such major lines as the "Big Inch" were given A-1-A priority ratings at a time when all war agencies were clamoring for steel. In this single project about 370,000 tons of steel were needed for pipes, pumping stations, terminal storage and equipment.

Cost of the line was about $95,000,000. If operated at capacity for the next five or six years, the line is expected to pay for itself.

The entire pipeline program has been vigorously prosecuted. War Emergency Pipelines Inc.'s projects probably will be completed by year's end with the exception of the 20-inch line from Texas to the Atlantic coast and a 16-inch line from Sundown, Tex., to Drumright, Okla. About 4500 miles of new pipe already have been laid, 2600 miles of second-hand pipe relocated, and some 3400 miles of pipe have been reversed and converted from other lines.

In 18 months overland and inland transportation of petroleum products has increased about 700 per cent.

When government officials took under advisement the problem of petroleum transportation from Texas to the Atlantic seaboard steel and power efficiencies were the controlling factors. Officials learned that barges could deliver about 50/100 of a barrel of oil per day for each ton of steel used, tank cars 52/100 of a barrel of oil per day per ton of steel, whereas, large pipe lines like the 24-inch could deliver 82/100 of a barrel of oil each day for every ton of steel on the basis of the 300,000 barrels per day capacity of the line. By adding additional pumping stations the daily capacity of the "Big Inch" reportedly can be increased to 450,000 barrels each day so that the line could deliver 120/100 barrels each day for every ton of steel involved in laying the line.

Whirlwind Action on "Big Inch"

After this evaluation by government experts final approval of the "Big Inch" was granted on June 10, 1942. Two days later an order for about 550-miles of the 24-inch seamless steel pipe was placed with the National Tube Co. By July 15 contracts for laying the pipe were signed and the first welds were made on Aug. 3. The "Big Inch" was under way just 54 days after authorization.

National Tube Co., Lorain, O., swung into action on the order for the 24-inch pipe. A production pace of 5½ miles of pipe per day was maintained by the company for the western portion of the line from Longview, Tex., to Norris city, Ill. A 40-foot shell of the pipe was produced every minute of operation. Heavy machinery bevelled the end of each joint of the pipe and it was practically ready for the welder's torch when placed on the right of way. Only hand scraping of bevelled surfaces and interior swabbing of joints was required before the pipe was lined up.

Engineers on the "Big Inch" were presented with hundreds of problems never before encountered. Most important of all was assembling enough heavy equipment to handle the 24-inch pipe weighing approximately 3800 pounds for every 40-foot joint. Construction equipment was constantly in the process of being adapted to meet requirements of the tremendous undertaking. Redesigning of trucks, tractors, and winches was necessary to handle the heavy pipe under a wide variety of conditions—all new to the engineers. Bigger and tougher bending shoes were needed so that crews would be able to make a 5-degree hot bend within 10 minutes. This called for special winching equipment. Not enough of the large D8 tractors, the type needed to handle efficiently the 24-inch pipe, were available to contractors because of the pressing needs of some of the other war construction programs. Thus, lighter tractors were redesigned to perform the job.

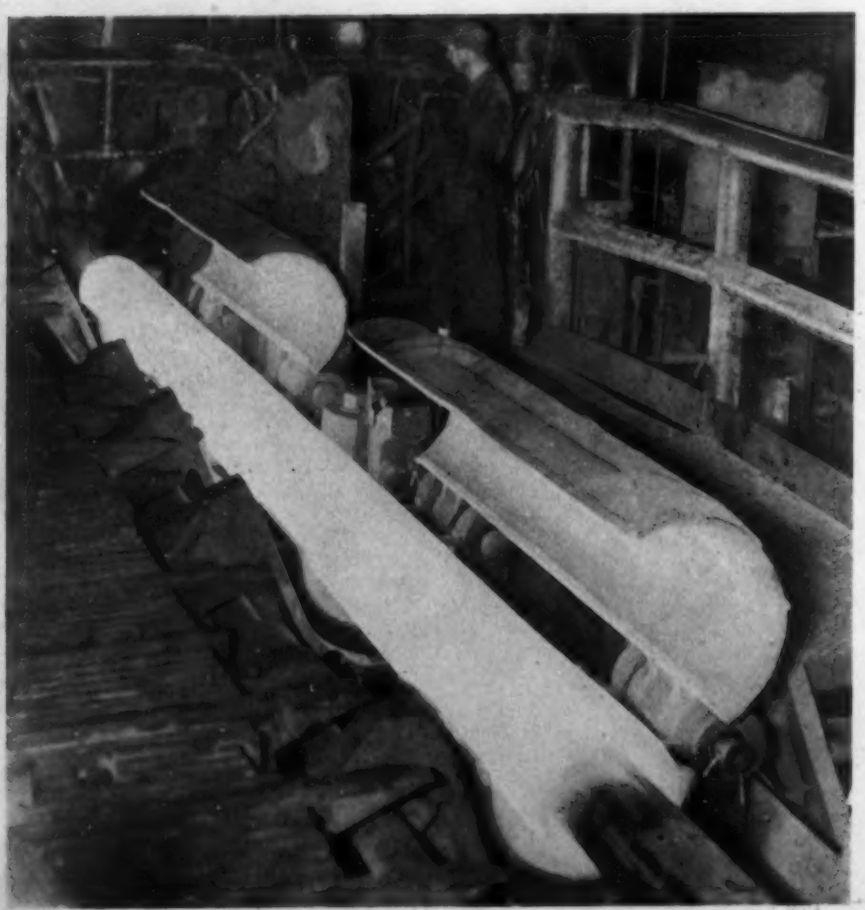
Originally only nine booster pumping stations were planned for the 531-mile section between Longview, Tex., and Norris city. But rivers and swamps and other inaccessible places made it necessary to add a tenth. About 78 electric motors are used on the entire line from Texas to the Atlantic seaboard. High-voltage transmission lines are within a reasonable distance of each station site.

Daily Capacity of 300,000 Barrels

A 24-hour test run on the western leg of the "Big Inch," extending from Longview to Norris city, showed that 328,000 barrels of Texas crude oil passed through the line. But the year around average daily capacity is calculated by pipeline experts at about 300,000 barrels, which allows for a 5 per cent leeway for variations in operating conditions during the summer and winter.

About 3,700,000 barrels of crude oil was required to complete the line fill from Texas to New York and Philadelphia refineries.

When the full complement of pumping stations is in operation, sometime around Sept. 15, it will permit the release of about 8500 tank cars for other service. Later some of these cars will be



Final length of the "Big Inch" took shape exactly four months from the time work was begun at the Lorain, O., Works of the National Tube Co. Here the first piercing machine forms an opening through the hot steel billet

used to haul refined products to the East off the first leg of the new 20-inch products line now under construction between Texas and Norris city, Ill.

This 20-inch line, called the "Little Big Inch," will be about 1700 miles long. The line's 88 electric motors will have a total of more than 100,000 horsepower and will pump oil through the line with a force equivalent to 188 mountain freight locomotives pulling at full throttle. These motors, driving pumps, will deliver daily from the vicinity of Houston and Beaumont in Texas to New York and Philadelphia areas 235,000 barrels of gasoline, as much as could be carried in 14 freight trains each made up of 75 average sized tank cars.

The "Little Big Inch" will have direct connections with 12 oil refineries. It stretches north and east through Texas into Arkansas where it meets the "Big Inch" carrying crude oil from Longview, Tex. From this point it parallels the "Big Inch" through Missouri, Illinois, Indiana, Ohio, across the bottom of Pennsylvania to the Philadelphia and New York areas.

Construction of the 836-mile section of the "Little Big Inch" from Houston-Beaumont refineries in Texas to Norris City, Ill., and Seymour, Ind., was approved last January and is under way.

About 44,600 tons of steel and $7,000,000 will be poured into construction of a 383-mile 16-inch pipe line from Sundown, Tex., to Drumright, Okla. Work on this line will get underway in October. It will have an initial capacity of 54,000 barrels of crude oil daily.

Pipeline construction has not been limited entirely to the Midwest and East for over in the San Francisco Bay area a 24-26-inch natural gas line has been converted. The line is providing 100,000 barrels of crude oil daily from Kettleman Hills in California to San Francisco.

About 30,000 barrels of gasoline are flowing daily through the 199-mile 8-inch line between Carabelle on the Gulf Coast to Jacksonville, Fla.

Completion of the 275-mile 8 and 10-inch lines and laying of the 179-mile 8-inch extension line to Richmond, Va., will permit the delivery of 60,000 barrels of petroleum products daily at Baton Rouge from the Houston-Beaumont area.

Construction on the 200-mile 8-inch refined products line with a daily capacity of 30,000 barrels is under way from East Chicago to Toledo, O. Proposal for building a 165-mile 10-inch line from Albany, N. Y., to Boston to move fuel oil is under consideration. From Brecksville, O., in the vicinity of Cleveland, a 120-mile 20-inch natural gas line is being constructed to Maumee, O.

Early in October work will be started on a 240-mile 26-inch line from Hugoton, Kans., to Blackwell, Okla. Another important project is a new 1200-mile natural gas pipe line recently approved by WPB. This line will stretch from the Southwest to the Appalachian manufacturing area and probably will be completed by the winter of 1944-45. It will be either a 22 or 24-inch line and will cost about $50,000,000 and require approximately 215,000 tons of steel. Present estimates call for delivery of more than 200,000,000 cubic feet of natural gas daily but this can be increased to 300,000,000 if necessary.

Complete Many Pipelines

Some of the projects already completed are reversal and conversion of a pipeline between Port Arthur and Dallas, Tex.; reversal and conversion of a line across Pennsylvania; enlargement of a line from Wood River to Lima, O.; reversal of a line from Cleveland to the Atlantic seaboard and enlargement of a line between Tulsa, Okla., and Chicago.

Before Pearl Harbor gasoline was moved from Houston, Tex., to New York city by tanker at a cost of one-half cent a gallon. Railroad tank car cost was about five cents per gallon. Oil companies found it cheaper to haul petroleum products by tanker over the longer distances and neglected to build pipelines over vast stretches of territory because of the enormous expense involved and the difficulties of obtaining a right-of-way.

But new standards in pipeline economics are being established. It has been found that oil can be moved much cheaper through big diameter lines as compared with the 8-10-12 inch lines used before the war. A definite trend has been established and it is likely smaller pipelines will be replaced by larger diameter lines.

Present, Past and Pending

■ FIRST UNIT OF TEXAS STEEL PLANT COMPLETED

DALLAS—Speaker of the House Rayburn, in an address at ceremonies marking completion of the Lone Star Steel Co.'s first unit of its $20,000,000 plant at Daingerfeld, Tex., predicted "the beginning of a great era for the people of this section."

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■ ESTABLISH POLICIES FOR SCHOOL-WORK PROGRAMS

WASHINGTON—Joint statement of policies governing school-and-work programs for boys and girls under 18 has been issued by the War Manpower Commission.

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■ BYERS' NEW ELECTRIC FURNACE POURS FIRST HEAT

PITTSBURGH—First heat of electric steel from the new 40-ton heroult electric furnace in the Ambridge, Pa., plant of A. M. Byers Co., was poured Sept. 3. The 25-ton unit, installed several months ago, will be enlarged to 40 tons capacity.

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■ RENEGOTIATION SEEN DELAYING PLANTS' PRODUCTION

CHICAGO—F. N. Bard, chairman, Illinois Manufacturers Association committee investigating Illinois industry's experience with government renegotiation activities, says the committee has concluded this law is retarding procurement.

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■ CHICAGO CONFERENCE TO DISCUSS POSTWAR EMPLOYMENT

CHICAGO—Wartime labor policies and postwar employment are among subjects to be discussed at the tenth annual Midwest Industrial Relations Conference, Sept. 17, at the University of Chicago.

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■ GOVERNMENT RETURNS 138 MORE MINES TO OWNERS

WASHINGTON—The Coal Mines Administration has released 138 more mines to 94 companies, making total of 687 mines returned to private possession since Aug. 21. The Coal Mines Administration is still operating 2691 mines belonging to 2053 companies.

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■ GOODRICH SYNTHETIC RUBBER PLANT STARTS PRODUCTION

AKRON—B. F. Goodrich Co.'s new plant at Port Neches, Tex., said to be the world's largest synthetic rubber plant, is now in production.

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■ PRODUCE ARMOR PLATE IN HALF FORMER TIME

NEW YORK—Battleship armor plate is now being turned out in less than half the time required for its production before the war. Shipments are being made five months and six days after raw materials are charged into furnaces.

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■ NEW TEXAS PIPELINE TAPS IMPORTANT PERMIAN BASIN

WASHINGTON—War Production Board has approved construction of Texas pipeline from Midland to Corsicana to provide additional outlet for oil from the West Texas-New Mexico Permian Basin.

Buffalo Plan Moves West

Controlled hiring system to be instituted in critical labor areas of Pacific Coast where 260,000 more workers are needed in aircraft plants and shipyards

CONTROLLED hiring and other drastic steps to ease the critical manpower shortage on the West Coast will be instituted this week by the Office of War Mobilization.

The program, an adaptation of the "Buffalo Plan", developed out of studies by Bernard M. Baruch and John Hancock, advisers to OWM Director James F. Byrnes. It provides for a two-fold attack on the manpower shortage by making maximum use of workers available and balancing production programs with the labor supply. The latter may involve the shifting of some war contracts away from the West Coast.

The manpower scarcity on the West Coast, especially in Los Angeles, San Francisco and San Diego, Calif., Portland, Oreg., and Seattle, has been among the most acute anywhere in the United States and has been ascribed as the cause for failure to meet certain war materiel schedules. Mr. Byrnes estimates 160,000 more workers will be required in shipbuilding and ship repair and 100,000 in aircraft production this fall.

If the extension of the Buffalo plan succeeds in alleviating the situation on the West Coast, it will be applied to other areas.

National Service Law Possible

If the plan does not succeed, pressure for a national service law is expected to be increased. The War and Navy Departments are understood to favor such an act now, but many congressmen and other government officials believe there is not yet enough public acceptance of such legislation.

The program to be put into effect on the West Coast calls for co-operative action by the War Production Board, handling the balancing of production plans with available manpower, and by the War Manpower Commission, obtaining greatest possible use of available labor, putting into effect a priority system on workers and engaging in a recruiting campaign to get as much new labor into the area as possible. The latter may involve the use of war prisoners and foreign laborers.

The program calls for the following action:

1. Supply and distribution of labor will be handled by the WMC through area production urgency committees to be set up in various districts along the coast. Each committee will include representatives of the WMC and WPB, the Office of Defense Transportation, the Aircraft Resources Control Office, the government procurement agencies and any other agencies whose representatives may be pertinent.

The committees will make recommendations for adjustment in military programs to meet acute labor situations to the chairman of the production executive committee of WPB and will keep the WMC informed of local labor situations.

2. Manpower priorities committees, also made up of representatives of the various war agencies concerned, will determine priorities and allocations of manpower on the basis of urgencies determined by the production urgency committees.

Chairmen of the area manpower priorities committees will be selected on the recommendation of present management-labor committees in the affected area and will be appointed by WMC.

3. WMC will establish standards for the priorities committee to be used in translating production urgencies into priorities.

4. WMC will integrate the work of the area priorities committees with its established appeal organization and the existing management-labor committee setup.

5. Future expansions requiring manpower on the coast will be avoided as far as possible. All appeals for new facilities and supply contracts will be reviewed by the area production urgency committees, which will report findings to WPB.

6. Labor released in one area will be immediately utilized elsewhere.

7. Where possible, war production will be moved from the West Coast by forcing subcontracting and by other means, always with due regard for the efficiency of producers.

8. Setting up by WMC of manpower priorities for all non-agricultural labor will involve channeling of all hiring through the United States Employment Service and other approved channels.

9. War Food Administration will determine farm labor requirements and keep the priorities committees informed

Influx of new workers into rapidly expanding West Coast war production centers has given rise to serious housing, transportation and service problems, which make difficult further importations of labor. Here an aircraft company's trucks are pressed into service to carry workers to and from the plant. NEA photo

of them. In peak seasons the WMC will aid the WFA in obtaining prisoners of war and foreign labor (Mexican) to aid in harvesting. Deferments granted farm labor will be checked.

10. Selective Service withdrawals from rated establishments will be related to employment ceilings and replacement possibilities, with adequate consideration for deferment of the key worker.

Registrants in critical occupations will receive "full consideration if they are working in high priority establishments." If they are not working in such establishments, but are qualified for such work, they will be referred to USES for placement when called by their local boards.

11. WMC will conduct campaigns not only to impress the war workers with the importance of their roles, but in an effort to convince the cities concerned with the important part they are playing in the war effort.

Steel Earnings Down 8 Per Cent in First Half 1943

Earnings of steel companies in the first half of this year dropped 8 per cent below the corresponding period last year, and were 40 per cent less than earnings in a representative peacetime year such as 1937, according to the American Iron and Steel Institute.

In the six months net earnings of a group of companies representing 90 per cent of the industry's capacity totaled $94,522,000 after all charges and before dividends. In the corresponding 1942 period substantially the same group of companies earned a total of $102,743,000 and in 1937 the corresponding figure was $159,054,000. Indicated return on investment in the first half was 4.9 per cent per year as against 5.3 per cent a year ago.

Sharp increase in payrolls was the major factor for the decline in earnings. For the first six months aggregate payments of reporting companies amounted to $1,236,485,000, almost 30 per cent more than the total of $969,955,000 distributed in the first half of 1942.

Taxes provided by the companies in the first half amounted to $335,178,000, somewhat less than tax provision in the corresponding period of 1942. Dividends paid stockholders amounted to $69,372,000 against $72,846,000 a year ago.

Instrument Makers Oppose Cut in Preference Rating

Proposed reduction in priority ratings for key components of industrial instruments would be detrimental to the industry, members of the Industrial Instrument Advisory committee agreed at a meeting with representatives of War Production Board in Washington recently. The proposed basic rating assigned to industrial instruments is AA-2X.

Wrecks Emphasize Equipment Need

Wave of mishaps may necessitate reconsideration of steel allotments. Car program now calls for 30,000 units for domestic use during next three quarters

EXCESSIVE use of worn and inadequate equipment coupled with human laxity under wartime tension has contributed heavily to the recent wave of rail accidents in the opinion of many railroad and steel officials.

Four major factors are believed to have contributed to the wrecks: (1) Inadequate allotments of steel and other materials for equipment; (2) excessive use of equipment to handle the heaviest traffic load on record; (3) inadequate repair and maintenance because of the press of traffic; (4) inadequate and inexperienced manpower.

In many quarters it is thought that the wrecks, especially the Pennsylvania and New York Central tragedies, may lead to a reconsideration of steel allotments to the carriers to prevent further catastrophes.

The prevalence of wrecks was not surprising to railroad officials and steel men. As early as last spring, Joseph B. Eastman, director of the Office of Defense Transportation, warned a House appropriations committee that transportation equipment was being driven so hard and that so few replacements were available that it was quite possible that the entire system might collapse "like the one-horse shay".

Last week he warned that the carriers are facing a manpower shortage and now are getting many "green hands."

Shirley N. Mills, safety director for the Interstate Commerce Commission, reported that 8209 rail accidents occurred during the first six months of 1943, a 30 per cent increase over the comparable 1942 period. This was attributed to the fact that more and longer trains are being operated at greater speeds.

War Production Board officials have recognized this situation to some extent by liberalizing allotments of materials for car and locomotive programs. A large amount of the new equipment, however, is for export.

The domestic carbuilding program for the fourth quarter and the first two quarters of 1944 at present calls for about 10,000 cars a quarter. In addition the Army and lend-lease are ordering about 40,000 units. The bulk of the Army cars, which include 7600 56-ton flat cars for Russia, are to be delivered during the fourth quarter and first three months of next year.

Domestic car awards so far this year have lagged behind previous recent years. For the first eight months, awards were only 16,992, compared with 24,030 in the first eight months of 1942 and 103,902 in the comparable 1941 period.

Carbuilders are not at all certain where the steel for the new units is coming from. On plates, sheets and bars mills generally are booked through the remainder of the year.

Fourth Quarter Domestic Car Allocation

Chicago & Alton	500 hopper	American Car & Foundry Co.
Chicago & Alton	500 box	Pullman-Standard Car Mfg. Co.
Atchison, Topeka & Santa Fe	400 box	Pullman-Standard Car Mfg. Co.
Baltimore & Ohio	150 hopper	Bethlehem Steel Co.
Central of Georgia	150 box	Pullman-Standard Car Mfg. Co.
Chesapeake & Ohio	620 hopper	American Car & Foundry Co.
Chicago & North Western	250 flat	Pullman-Standard Car Mfg. Co.
Chicago, Burlington & Quincy	600 hopper	Company shops
Chicago & North Western	100 flat	Pullman-Standard Car Mfg. Co.
Chicago, Milwaukee, St. Paul & Pacific	200 box	Company shops
Chicago, Milwaukee, St. Paul & Pacific	400 hopper	Company shops
Clinchfield	300 hopper	American Car & Foundry Co.
Denver & Rio Grande Western	500 gondola	Pressed Steel Car Co.
Great Northern	500 box	Company shops
Illinois Central	300 hopper	Company shops
Indiana Harbor Belt	575 box	Despatch shops
Lehigh Valley	250 gondola	Bethlehem Steel Co.
Lehigh Valley	400 hopper	Bethlehem Steel Co.
Midland Valley	25 hopper	American Car & Foundry Co.
Missouri Pacific	550 hopper	American Car & Foundry Co.
Norfolk & Western	500 hopper	Bethlehem Steel Co.
Norfolk & Western	500 hopper	Virginia Bridge & Iron Co.
Reading	600 hopper	Company shops
St. Louis Southwestern	200 box	Company shops
St. Louis-San Francisco	100 box	Company shops
Virginia Railway	600 hopper	Company shops
Wabash	175 box	Company shops
Wabash	50 gondola	Company shops
Wabash	25 hopper	Company shops
Ann Arbor	25 box	Wabash shops
New Jersey, Indiana & Illinois	50 box	Wabash shops
Total	9645	

Switch to Electric Steel Sought To Release Open Hearth Capacity

War Production Board directs greater alloy steel load to electric furnaces in move to utilize more open hearths in production of carbon steel, requirements for which now are in excess of supply

STEEL buyers are being urged to use electric furnace alloy steel instead of the open hearth variety, to release open hearth capacity for production of carbon steel, for which requirements are in excess of supply.

The Steel Division, War Production Board, has begun to work out with claimant agencies and producers means for effectuating this changeover.

In an appeal to the steel industry last week, John T. Whiting, director, Steel Division, pointed out that electric furnace capacity has been so greatly increased this year a large proportion of alloy steel now produced in open-hearth furnaces can be switched to electric furnaces. Electric furnace capacity has jumped from 150,000 tons a month in 1940 to 328,000 tons this July. By the end of this year, the estimated monthly capacity will be 471,000 tons, Mr. Whiting pointed out.

"Electric furnace alloy steel ingot capacity was approximately 150,000 tons per month when the heavy demands for this product came with the beginning of the defense program in 1940," said Mr. Whiting. "Planes, munitions and other material of modern warfare require the use of alloy steel to meet the most exacting specifications and many contractors and subcontractors preferred and specified electric furnace steels. It soon became clear that the capacity for this steel was far short of meeting the projected requirements of the armed services.

"The problem was attacked vigorously from two directions. A great expansion program was launched to provide additional electric furnace facilities to meet the growing demands of the war program. At the same time, an industry-wide and extensive metallurgical campaign was undertaken, in collaboration with the armed services, to develop suitable alloy steels which could be made in open-hearth furnaces and which would use a minimum amount of critical alloys. These steels were designed to supplement the electric furnace alloy steels until such time as the new electric alloy steel capacity could be installed.

"In 1942 the expansion program permitted an average monthly production of 276,000 tons of electric furnace alloy steel ingots, and 328,000 tons in July of this year. The program will be completed by the end of 1943 and then the monthly capacity will be 471,000 tons. Thus, we will have tripled our electric furnace alloy steel capacity in a period of three years.

"Concurrently production of alloy steel in open-hearth furnaces was increased at a rapid rate. The average monthly production for this grade of steel in 1940 was 306,000 tons; in 1942 it was 664,000 tons, reaching a peak production in March of this year of 934,000 tons.

"All the electric furnace capacity of the country must be used for producing a large part of the alloy steel now being melted in open-hearth furnaces so that the open-hearth furnace capacity so released can be used to produce increased tonnages of carbon steel. This will aid substantially in meeting the carbon steel requirements of the claimant agencies. These requirements are now well in excess of the supply. I realize that these tonnages will dislocate certain existing arrangements and cause some difficulties.

"The reversion from open-hearth to electric furnace alloy is so clearly in the best interest of the overall war program and essential to the fullest utilization of steel producing facilities, that I urge all steel consumers and producers to co-operate to the fullest extent possible."

PEAK PAYROLLS

Monthly payrolls of the steel industry climbed to a new peak during July, totaling $142,769,000, more than five million dollars above the previous peak of $137,404,000 paid out in May, according to the American Iron and Steel Institute.

Steel employment continued to decline during July, total employes during the month being 627,000, compared with 631,000 in June and 655,000 in July, 1942.

Wage-earning employes averaged 115.5 cents per hour in July, highest on record.

Wage earners worked an average of 43.5 hours per week in July against 43.3 hours in June and 38.4 hours in July, 1942.

New Technical Groups Appointed

American Iron and Steel Institute seeks to improve production practice to end output will be increased without adding to existing facilities

FOR the purpose of developing ways and means for increasing steel production without adding to existing facilities, four additional technical committees have been named by the Committee on Manufacturing Problems of the American Iron and Steel Institute.

Such problems as how to improve the yield per heat of finished product, how to reduce time in producing open hearth and electric steel and how to better coke oven production in such a way as to improve blast furnace practice and thus obtain more tons of pig iron and, in turn, more tons of steel, are on the agenda for discussion by these committees.

The four technical committees are on blast furnace practice, coke oven practice, electric furnace steelmaking and open-hearth steelmaking, respectively. H. W. Johnson, Inland Steel Co., Chicago, is chairman of the blast furnace committee. Other members are: B. C. Butler, Pittsburgh Steel Co.; Harold Cope, American Steel & Wire Co.; J. S. Ferguson, American Rolling Mill Co.; R. A. Field, Jones & Laughlin Steel Corp.; G. W. Hewitt, Wheeling Steel Corp.; C. F. Hoffman, Bethlehem Steel Co.; and T. H. Kennedy, National Tube Co.

Also R. A. Lindgren, Wisconsin Steel Co.; C. E. Mathis, Interlake Iron Corp.; H. E. McDonnell, Weirton Steel Co.; J. H. Slater, Republic Steel Corp.; H. A. Strain, Carnegie-Illinois Steel Corp.; B. M. Stubblefield, Youngstown Sheet & Tube Co.; and I. F. Wolfgram, Alan Wood Steel Co.

The coke oven committee is headed by R. W. Campbell, Jones & Laughlin Steel Corp., Pittsburgh. Other members are: Harold Cope, American Steel & Wire Co.; E. G. Cox, Tennessee Coal, Iron & Railroad Co.; E. J. Gardner, Inland Steel Co.; L. A. Kraemer, Pittsburgh Steel Co.; E. A. Lee, National Tube Co.; P. C. Mayfield, Alan Wood Steel Co.; H. E. McDonnell, Weirton Steel Co.; H. A. Strain, Carnegie-Illinois Steel Corp.; B. M. Stubblefield, The Youngstown Sheet & Tube Co.; C. E. Underwood, Bethlehem Steel Co.; J. W. Unroe, Wheeling Steel Corp.; M. D. Wald, Republic Steel Corp.; and Frank Wilkes, The American Rolling Mill Co.

S. D. Gladding, Bethlehem Steel Co., Bethlehem, Pa., is chairman of the electric furnace committee. Other members are: W. J. Beuchling, Copperweld Steel Co.; Wilbur Bischoff, Timken Steel & Tube Division, The Timken Roller Bear-

ing Co.; H. A. Darlington, The Youngstown Sheet & Tube Co.; B. H. DeLong, Carpenter Steel Co.; and L. L. Ferrall, Rotary Electric Steel Co.

Also C. R. FonDersmith, The American Rolling Mill Co.; H. W. McQuaid, Republic Steel Corp.; C. A. Scharschu, Allegheny Ludlum Steel Corp.; A. L. Sonnhalter, Crucible Steel Co. of America; and F. L. Toy, Carnegie-Illinois Steel Corp.

Heading the open hearth committee is E. A. Schwartz, Republic Steel Corp., Cleveland. Other committee members are: E. D. Buchanan, National Tube Co.; C. Denlinger, Bethlehem Steel Co.; R. C. FonDersmith, The American Rolling Mill Co.; A. F. Franz, Alan Wood Steel Co.; C. A. Kellogg, Continental Steel Corp.; and W. C. Kitto, Pittsburgh Steel Co.

Also L. A. Lambing, Jones & Laughlin Steel Corp.; J. H. McElhinney, Wheeling Steel Corp.; A. P. Miller, Inland Steel Co.; S. M. Newbrander, Weirton Steel Co.; E. H. Schwartz, Wisconsin Steel Co.; A. L. Sonnhalter, Crucible Steel Co. of America; F. L. Toy, Carnegie-Illinois Steel Corp.; C. E. Williams, American Steel & Wire Co.; and W. H. Yeckley, Youngstown Sheet & Tube Co.

Shipyards Deliver 164 New Cargo Vessels in August

The Maritime Commission last week announced the nation's shipyards delivered 164 cargo vessels totaling 1,697,400 deadweight tons during August. Since Pearl Harbor American shipyards now have delivered nearly 18,000,000 deadweight tons of shipping and an additional 9,000,000 tons probably will be delivered by January, 1944.

Contracts for construction of 156 additional vessels were announced last week. Eighty-six new type small cargo vessels will be built by six companies on the Great Lakes and West Coast. Known as the C1-M-AV1, the vessel is 320 feet long, diesel propelled, and about 4000 ton. Contracts also were awarded for construction of 70 vessels including six C-type and 64 special type by the Maritime Commission.

DISTRICT STEEL RATES

Percentage of Ingot Capacity Engaged in Leading Districts

	Week Ended Sept. 11	Change	Same Week 1942	Same Week 1941
Pittsburgh	100	+1	95	99
Chicago	99	—0.5	101.5	101
Eastern Pa.	95	None	95	95
Youngstown	97	—1	97	98
Wheeling	99	+1	80	94
Cleveland	94	None	94.5	92
Buffalo	90.5	None	90.5	90.5
Birmingham	100	+5	95	95
New England	95	+3	95	90
Cincinnati	94	None	91	89
St. Louis	90.5	+17.5	95.5	98
Detroit	90	None	93	94
Average	99.5	+0.5	*98	*96.5

*Based on steelmaking capacities as of these dates.

August Steel Production Tops That During July

Steel ingot production in August totaled 7,562,125 net tons, according to American Iron and Steel Institute. This is an increase of 185,892 tons over July output but is short of the all-time peak of 7,670,187 tons produced in March this year.

Open-hearth steel output during the month was 6,669,944 tons, 98.3 per cent of capacity; bessemer, 484,957 tons, 94 per cent of capacity; electric steel, 407,224 tons, 97.1 per cent of capacity. For the industry as a whole output amounted to 97.9 per cent of capacity.

Calculated weekly output for the month was 1,707,026, there being 4.43 weeks in the period.

Owing to new capacity figures as of July 1, percentages have been revised showing open-hearth steel output in that month at 96.2 per cent of capacity, bessemer at 90.6 per cent, electric steel, 94 per cent and total for the industry, 95.7 per cent.

Steel Output at New Peak Level

Ingot operating rate up half point to 99.5 per cent; on tonnage basis output sets new record

PRODUCTION of open-hearth, bessemer and electric furnace ingots last week advanced one-half point to 99.5 per cent of capacity; year ago the national rate was 98 per cent; two years ago 96.5 per cent.

Ingot production last week slightly exceeded 100 per cent figured on basis of theoretical open-hearth plant capacities, which takes into account a factor for necessary furnace repairs. STEEL's compilation is based on the number of open-hearth units in operation, and weighted in relation to their size. On a tonnage basis output last week established a new all-time record.

Chicago and Youngstown were the only steel centers to record a decline last week; gains occurred in the Pittsburgh, Wheeling, Birmingham, St. Louis and New England areas.

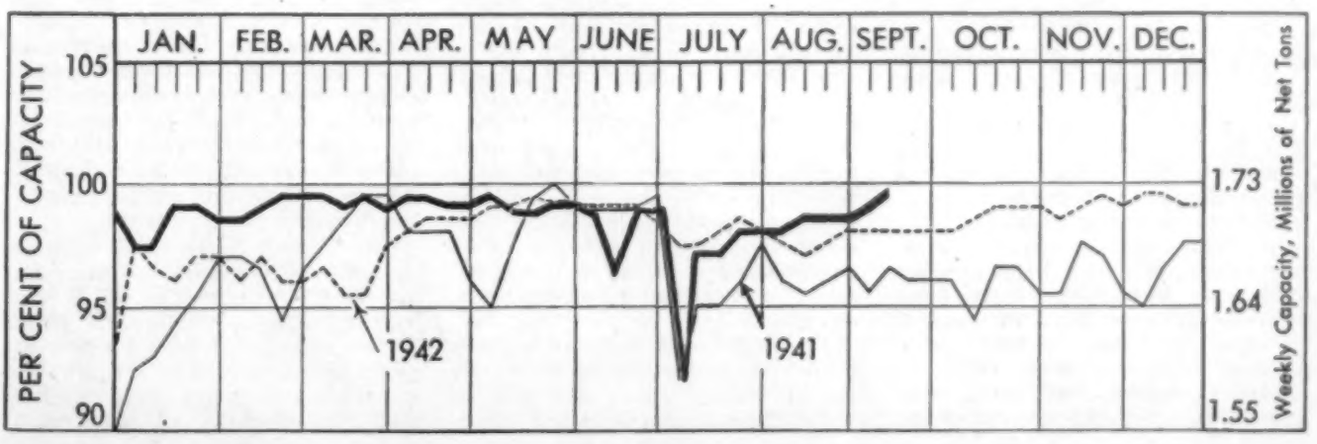
Blast furnace operations at Buffalo were off six points to 88 per cent as Hanna Furnace Corp. shut down one of four active furnaces for relining. Wickwire Spencer Steel Co. will blow out a blast furnace early next month.

Steelmakers at some centers are expressing renewed concern over coal supplies.

Carnegie Steel Sets New Output Record in August

Steelmakers of Carnegie-Illinois Steel Corp. shattered all past records for production in August. The company's furnaces achieved an all-time high output for one month, producing 1,962,631 tons of ingots, 19,000 tons better than the best previous record.

COMPARATIVE STEEL INGOT OPERATIONS



CARL VINSON
Chairman, House Naval Affairs Committee

ANDREW J. MAY
Chairman, House Military Affairs Committee

WALTER F. GEORGE
Chairman, Senate Finance Committee

HARRY S. TRUMAN
Chairman, Special Senate Investigating Committee

PROGRAM BROADEST IN HISTORY

Renegotiation, contract termination, postwar public works, price control and rationing, taxes, government expenditures, manpower and demobilization of servicemen among problems on agenda

WHEN the seventy-eighth Congress reassembles Sept. 14 after its summer recess it will start to gallop in all directions at once.

This is said not in any disparaging way—for the seventy-eighth Congress is turning out to be the best in a good many years. It results from the fact that the legislative program of this Congress is the broadest in history.

Hearings will be held simultaneously by numerous committees and subcommittees concerned with the formulation of numerous laws of great significance to the country's manufacturers and businessmen.

First emphasis will be on revision of the contracts renegotiation law. The full House Ways and Means Committee last Thursday began hearings on this subject, to be carried on by subcommittees after the line of approach has been charted. The committee will break down the whole subject of contracts renegotiation. It will try to formulate a definition as to what comes under the head of "excessive profits." It proposes to find out whether renegotiation discourages incentive. It is concerned with the extent to which renegotiation prevents contractors and subcontractors from accumulating financial reserves to tide them over the period of postwar adjustment.

One proposal to be considered in the renegotiation hearings, by Representative Charles S. Dewey (Rep. Ill.), is a revision of the tax laws to encourage heavy investments of private funds in industrial enterprises in the hope of earning a profit. Some Ways and Means Committee members have expressed fears that continuance of present tax rates, while justified during the war due to heavy government purchases, would put grave difficulties in the path of employment in the postwar era.

Among immediate hot subjects is the drafting of pre-Pearl Harbor fathers. Numerous congressmen are very emphatic on this subject. The debate is sure to include many references to compulsory labor legislation. Two senators who last spring were opposed to the idea of a compulsory labor law have come back with changed minds as a result of what they learned during the recess. On the whole a compulsory labor law, however, is not seen as an immediate probability. Congress is not expected to take action to lengthen the 40-hour work week.

May Attack Patent System

Another series of attacks on the American patent system is almost sure to be made at some time during the coming months. All of them will be aimed at setting up some sort of a federal licensing system. Hearings of the Kilgore Committee will start Sept. 15 and will be watched with interest. The Department of Justice is said to have formulated a vicious bill which it has not yet been able to persuade any congressman to introduce. It is not likely these attacks will be successful. On the other hand, the Kettering National Patent Planning Commission is expected to submit its recommendations on improving the patent system in plenty of time for deliberation in this session.

The Senate Small Business Committee is preparing to hold hearings on the subject of making prompt and adequate settlements with contractors and subcontractors whose contracts have been or will be terminated or cut back. Other Congressional committees and subcommittees also will touch on this vital subject. The idea is to get machinery set up now that can be applied effectiyely immediately after the close of the war to prevent widespread bankruptcy and financial embarrassment. The agreement among the armed services that they already possess legal authority to guarantee "V" loans to such contractors and subcontractors will be studied to make certain that this plan will work. Representatives of the armed forces will be questioned to ascertain whether specific additional legislation will be needed. Various bills, such as S. 1268, that have to do with this problem, will be studied.

Major attention will be given in both houses to the matter of preparing plans for public works projects to afford employment after the war. This may include a federal works program, and state and municipal programs, with federal financial aid. The studies are being conducted in co-operation with a number of government agencies, particularly the Army Engineers. The intention is to get the public works matter out of the idea stage and have plans and specifications ready for immediate execution when needed.

One subject that will receive close attention from the Truman and other committees is that of investigating alleged frauds by contractors and other sabotage of the war production effort. The air is full of unconfirmed reports that the headlines will bristle with such charges before the snow flies.

Congress will lose no time scrutinizing the whole price and rationing setup and present indications are that the Office of Price Administration again will be placed on the carpet. Just what it will do on prices and rationing is not yet clear. The farmers and other pressure groups have their fingers in this pie. Gasoline ration-

ing will be the subject of a lot of questioning. A lot of attention will be given to food. General feeling among Congressmen is that the problems of food, prices and rationing now are being handled ineptly and that it should be possible to inject some horse sense here.

Congress also can be expected to look into the manpower problem which now is being handled with a particularly notable degree of ineptitude. The United States Employment Service almost certainly will be investigated for the impracticable way in which it recently sought to relieve that Southern Pacific railroad's labor shortage. It took 2200 easterners west from St. Louis but lost all but 510 of them to other industries before the party even reached the West Coast. Three weeks later only 104 of these easterners still were working for the Southern Pacific. The Brynes order to West Coast manufacturers arbitrarily to employ all persons assigned to them by the USES, without regard as to their qualifications, will come up for debate.

High on the Congressional priorities list is the formulation of plans for orderly demobilization of our fighting forces. Both the Army and Navy have been devoting a lot of study to this and already have laid the groundwork for a general plan. The "subsistence farm" idea is a part of this plan. Ex-servicemen would receive federal aid in purchasing small farms which they would farm part-time, the idea being that they thus would be free to earn money in other employment.

There are many angles to the subject of demobilizing the forces. Among them is the fact that 9000 men already are being mustered out of the service each week; they will number around 500,000 by the end of 1943. Many thousands now are recuperating in hospitals and shortly will be returning to normal life in large numbers; a million men will be mustered out in 1944. Congress wants these men, lacking an arm or a leg, to have jobs at good pay; they do not want them to serve as watchmen or work in other jobs in which opportunities for advancement are lacking. Current thinking is that private industry will have to get used to the idea of furnishing good employment to crippled men. This side of the problem incident to demobilization is the current responsibility of the Veterans Administration, Washington.

What Congress will do about taxes cannot yet be clearly foreseen. A rather leisurely procedure in drafting a new tax law was indicated until recently, with likelihood that a sales tax might be drafted, and with small increases in income taxes on corporate and individual incomes. However, Economic Stabilizer Vinson, who enjoys great prestige in Congress by reason of his sound tax record as a former member of the House Ways and Means Committee, is preparing to bring heavy pressure for the full increase of $12 billions in the tax load. He is working actively with the Treasury Department.

The tax situation is complicated by friction between Secretary of the Treasury Morgenthau and the Joint Committee on Internal Revenue Taxation. The latter, directed by Colin Stamm and supported by congressional tax leaders, has been insisting it be supplied information by the Bureau of Internal Revenue while Morgenthau insists that all information be funneled through him. Congress, still resentful over the Treasury's attitude during the Ruml plan debates, may use its subpoena powers to obtain the desired information, and the feud may develop into a first-class Washington mess.

In addition to acting on postwar plans to assist the domestic economy, Congress also can be expected to give serious consideration to our postwar relations with other countries, particularly in regard to trade and military considerations. There is mounting apprehension that if Congress does not go on record with its views, that if it permits the President to make international arrangements, another impasse such as that which developed after World War I may occur. Many Congressmen have strong views about retaining many of our present outlying military establishments in various parts of the world.

May Reduce Expenditures

Congress is expected to prosecute further its efforts at reducing government expenditures. One leading member, John Taber (Rep., N. R.), says savings effected earlier this year were only a flea bite and that there will be many additional reductions in the appropriations for the year 1944-1945. Now that we no longer are on the defensive anywhere in this war, there will be more critical views about the huge military expenditures. Both the Army and Navy will be handled somewhat less gently when they are questioned about huge inventories of various war materiel which have been built up.

Best reason for believing that a lot of important legislation will develop after the termination of the summer recess is that a great deal of the spade work already has been accomplished. Congressmen have been able during the recess to arrange their thinking in a more orderly way than was possible in the hectic days before recessing. They have had an opportunity to ascertain what is in the minds of the people back home.

Bolt, Nut and Screw Pricing Procedure Revised by OPA

Manufacturers have been given an option by the Office of Price Administration to use maximum price regulation No. 136 (Machines and Parts and Machine Services) in pricing special bolts, nuts, screws and rivets produced complete, or in their first operation, on hand or automatic screw machines. This permission does not result in any change in the price level as determined under regulation No. 147 (Bolts, Nuts, Screws and Rivets).

Defeated Nation Needs Supplies

Peninsula's history one of insufficiency of iron, steel, coal, oil and many nonferrous metals

ECONOMICALLY and industrially, capitulation of Italy is no bargain.

The peninsular nation is sadly lacking in critical raw materials, such as coal, oil, iron ore, copper, tin, nickel, magnesium, and rubber.

These materials, as well as food, must be supplied the defeated nation, if the United Nations are to realize any considerable benefits from the country's industrial machine.

Italy's munitions production industry has depended on Germany for supplies to large extent.

Italy's pig iron production in 1938, the last year for which figures are available, amounted to only 864,536 metric tons, and steel ingot output to 2,307,392 metric tons. Iron ore production seldom has exceeded 1,000,000 tons a year. Bauxite, sulphur, lead, mercury and zinc supplies have been sufficient.

Complete control of the Mediterranean will permit shipment of vitally needed battle scrap from North Africa. Lacking iron ore, this probably will be a big factor in the country's steel output.

Condition of Italy's war plants following intensive Allied bombing attacks and possible demolition by retiring German forces remains a question mark.

No immediate changes in the war production program in this country was expected to result from the surrender, although some speculation arose over further cutbacks in the tank program, which already has been reduced by 40 per cent.

Bureau of Mines Launches Search for War Materials

Bureau of Mines has launched the most extensive exploratory program ever undertaken in the United States and Alaska for war materials. It is financed under a $3,900,000 congressional appropriation item. The work is separate from two other exploratory programs which are being conducted simultaneously by the bureau —the investigation of raw material sources for steel and the projects designed to increase aluminum production.

Crews of the bureau will make examinations of industrial diamond areas of Arkansas, and of coal fields of Nevada and Oregon, and will conduct a search for quartz crystals and more than a dozen other minerals, including copper, asbestos, zinc, mercury, tungsten, vanadium, beryllium, and other pegmatites, corundum, molybdenum, manganese, tin, iron, chromium, bismuth and nickel.

WINDOWS of WASHINGTON

Fight "Featherbedding"

THE MARITIME Commission is conducting a campaign to "get greater production per worker" at all shipyards and ship component plants. One of the prime aims is to do away with union "featherbedding." The unions are proving cooperative and have rescinded these rules in some cases for the duration. In one yard 39,000 linear feet of welding is being produced daily compared with the previous average of 20,000 feet. This has come about by putting tack welders on production welding; tack welding now is being done by riggers, shipfitters and other workers.

Tires—Well, Maybe?

Outlook for tire production is getting better according to the Office of the Rubber Administration. As a result of priorities recently granted the tire manufacturers shortly will be getting a lot of new equipment including 84 Danbury mixers. It takes longer to mill synthetic than natural rubber. Too, since Pearl Harbor the tire manufacturers have been making many rubber products other than tires, also other types of tires than they had been making. The present program is aimed not only at continuing full production of all rubber military requirements but also "large" production of "passenger car, truck, bus and farm tires."

Peacetime Switch

The petroleum industry looms as a big postwar market for processing equipment of different kinds. During the war, largely incidental to its experience in preparing to produce synthetic rubber, the petroleum industry has developed new chemical methods by which it can make products of considerable variety—products that should have a large demand in time of peace. The petroleum industry is expected to be more of a "manufacturing" industry after the war; gasoline and fuel oil no longer will be the "be all" products and the oil companies are not expected to resume promotion of these products on the big scale of the past.

More Small Implements

A retired business man and successful farmer who is studying subsistence farming for senators from the farm states believes this practice would cause numerous industrial repercussions.

In the first place he thinks manufacturers have been designing agricultural machinery more for the large farm than the small farm. He believes there will be a big market among the small farmers for small, inexpensive tractors—as an example. He believes there will be a big market among the farmers for a type of motor vehicle not now available—something between the low-priced automobile and a gasoline-driven bicycle. He also looks for a big demand from subsistence farmers for safe, low-cost airplanes, perhaps of the helicopter type.

"Current thinking," he says, "is that there will be a lot of these subsistence farms—maybe in the neighborhood of 1,000,000."

Continual "Brown-Out"

Sept. 15 is the date set for beginning the "brown-out" period of reduced illumination. This is one phase of a broad conservation program to be set in motion in the coal, oil, transportation, electric power, natural gas, manufactured gas, water and communications industries. It is estimated 75,000,000 lamp bulbs and 4,000,000 tons of coal annually will be saved alone through the "brown-out." It also will make more tungsten wire filament available for the radio and radar programs; some molybdenum used in light bulbs will be saved.

PRODUCTION GRIPES

Here are the chief "gripes" among key men in the war production program:

They resent the feeling on the part of the public that the war is "in the bag".

They are irritated over the failure of many contractors to maintain promised delivery schedules. Too many contractors give excuses and alibis for delays.

They are irritated by hearing business men complain our military production schedules are "too big".

They are resentful over the large amount of speculation as to the fall of Germany through a crackup in morale. Actually, they point out, we have only begun our offensive; the hardest part of the fighting still lies ahead.

They also are resentful over hearing people in key war jobs say they are tired.

"Yes," says one of these men, "we are all tired, our fighting men become wearied to exhaustion. But that is no excuse for letting production lines slow down. Only by throwing the greatest possible weight of ammunition against the enemy will we keep our casualties at minimum and shorten the war."

Much To Be Done

More than 90 per cent of the Army's eleven billion dollar construction program here at home has been completed, according to Maj. Gen. Eugene Reybold, Chief of Engineers. On the other hand, construction work abroad to serve military purposes is on the increase.

OES Bewildered

One of the problems now under study by the Office of Economic Stabilization is that of wage differentials in different industries and trades in the same community. They are held accountable for a vast amount of labor turnover. At Seattle, for example, the Boeing plants are losing a lot of people to the shipyards because of the higher pay in the yards. An attempt has been made to cure this situation by establishing an incentive wage plan but so far the management and the workers have been unable to work out a solution.

Army's New Need

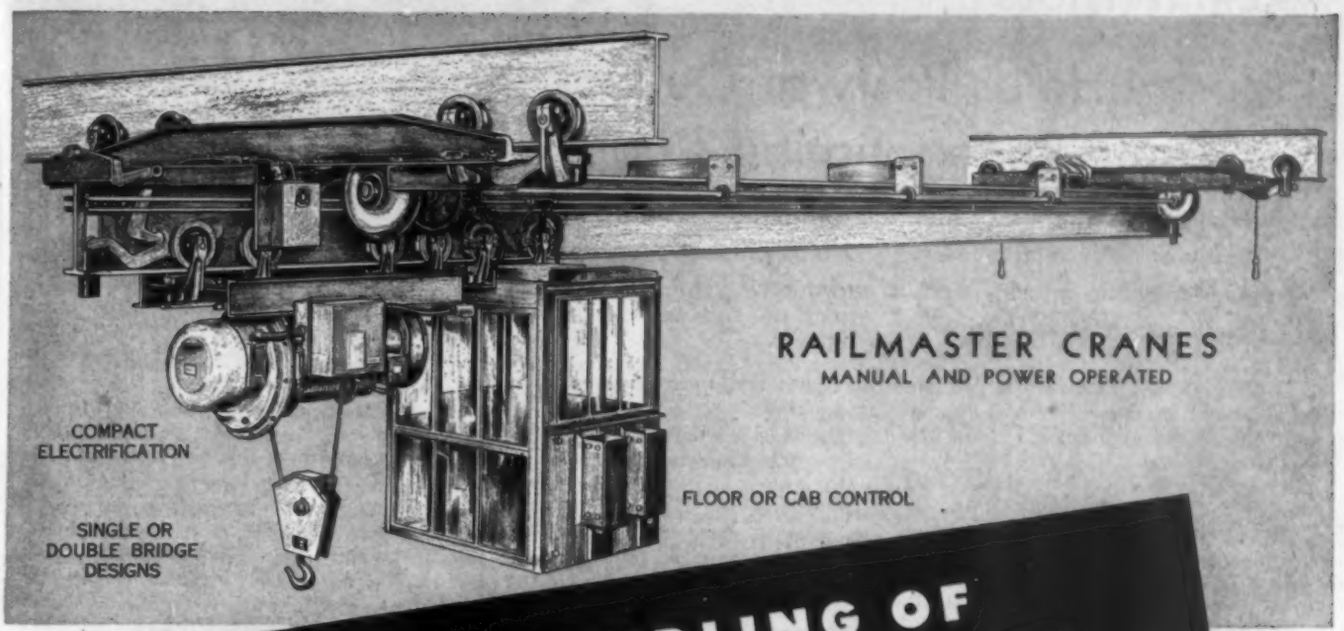
Critical situation is developing in road-building machinery now that our armed forces have started to invade enemy-held countries. Current indications are new production will come to some $800,000,000 for 1943 of which 92 to 93 per cent will be shipped overseas. The machinery in heaviest demand comprises cranes, shovels and tractors. It also includes a lot of road rollers, air compressors, concrete pavers and mixers, snow removers and trench diggers. About 25 per cent of export shipments consists of repair parts. Not much of the roadbuilding equipment going abroad is expected to come back to this country.

Speeds Settlement

One of STEEL's readers asks whether the War Department's Procurement Regulation No. 15 will result in any change in the present policy of recognizing advertising expenditures as allowable costs under government contracts. The answer is "no." Procurement Regulation No. 15 is merely an instrument for speeding up the settlement of contracts that have been terminated or cut back. Army and Navy accountants will continue to be guided by the instructions and definitions in the famous green book entitled "Explanation of Principles for Determination of Costs Under Government Contracts."

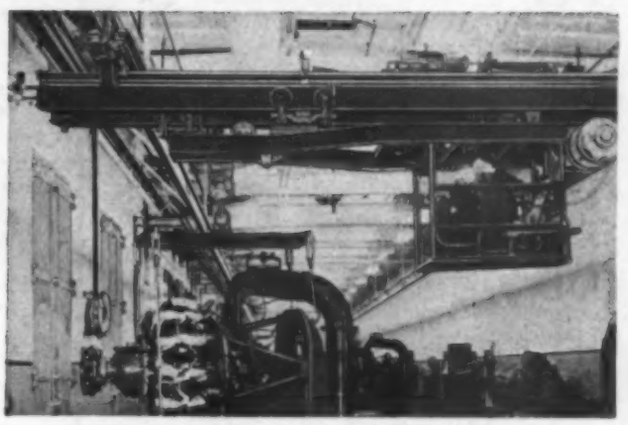
Turnings Remelted

Full consumption of machine shop turnings now has been brought about. One reason is production of such scrap is considerably smaller than anticipated. Early this year it was estimated production in 1943 might go as high as 4,000,000 tons of carbon steel turnings and 2,000,000 tons of alloy turnings. Production now is at the rate of 3,500,000 tons of carbon and 750,000 tons of alloy steel turnings annually. There is no problem at all with carbon steel turnings; they are melted in blast furnaces, open-hearth furnaces and electric furnaces. Their consumption is helped by the fact a large percentage of this scrap is crushed and degreased. It is estimated approximately 250 crushers are in operation today, mostly in generating plants, but some in consuming plants and in dealers' yards.



FLEXIBLE HANDLING OF *Massive Production*

B-28 Bomber Makes Maiden Flight on RailMaster Crane.



Spotting motors with telescoping crane.

MASSIVE loads set up no problem when American MonoRail RailMaster Cranes are on the job. They are not limited to bridging a single span but, with their special interlocking and twin bridge designs, they can cover any area with any type of handling equipment.

American MonoRail Systems, too, are adaptable to many handling problems, offering versatile application without lengthy engineering or costly adjustment. Let an American MonoRail Engineer explain the advantages of overhead handling without any obligation to you.

THE AMERICAN MONORAIL CO.

13102 Athens Avenue — Cleveland 7, Ohio

★ WRITE FOR BLUE BOOK SHOWING HUNDREDS OF MONORAIL INSTALLATIONS.

Industry Holds Postwar Outlook Warrants Renegotiation Changes

Pamphlet cites unusual situation of tool builders in contrast with many other manufacturers. . . Holds present procedure inimical to public interest and is endangering future existence of certain classes of business

"RENEGOTIATION, as at present administered, threatens the machine tool industry's postwar survival," states the National Machine Tool Builders' Association in a pamphlet published last week.

Stating it approves the principle of eliminating excessive profits, as well as review of contracts, the industry objects to present renegotiation procedure, claiming if these methods are persisted in they will deprive tool companies of earnings needed to weather a postwar machine tool depression.

In a statement accompanying the pamphlet, a committee of the association consisting of A. G. Bryant, Cleereman Machine Tool Co., Chicago; James Y. Scott, Van Norman Machine Tool Co., Springfield, Mass.; and Joseph L. Trecker, Kearney & Trecker Corp., Milwaukee, states: "In the firm belief that the procedure followed in renegotiating war contracts is contrary to the national interest during either war or peace and is unnecessarily endangering the future existence of certain classes of business, we are asking the Congress and the interested departments of the executive branch of the government to give consideration to our position.

"We speak only for this industry, although conscious that there are many others similarly interested."

In presenting the pamphlet the committee asks for earnest consideration of the following subjects:

1. Recognition of the special problems of machine tool and comparable industries as manufacturers of items that will be used in the war only temporarily and will for many remaining years saturate the postwar market.

2. Recognition of the variable excess profits tax burden which falls more heavily upon the industry because of the greater expansion required in comparison with normal output.

3. Recognition of the need for retention of earnings to provide cash reserves to maintain postwar employment, research and development of product.

4. Recognition of the principle that only earnings after taxes, rather than before taxes, should be reviewed.

5. Recognition of the need to exempt from renegotiation that part of the life of a machine which is not expended in the war and which will thus be engaged on peacetime work.

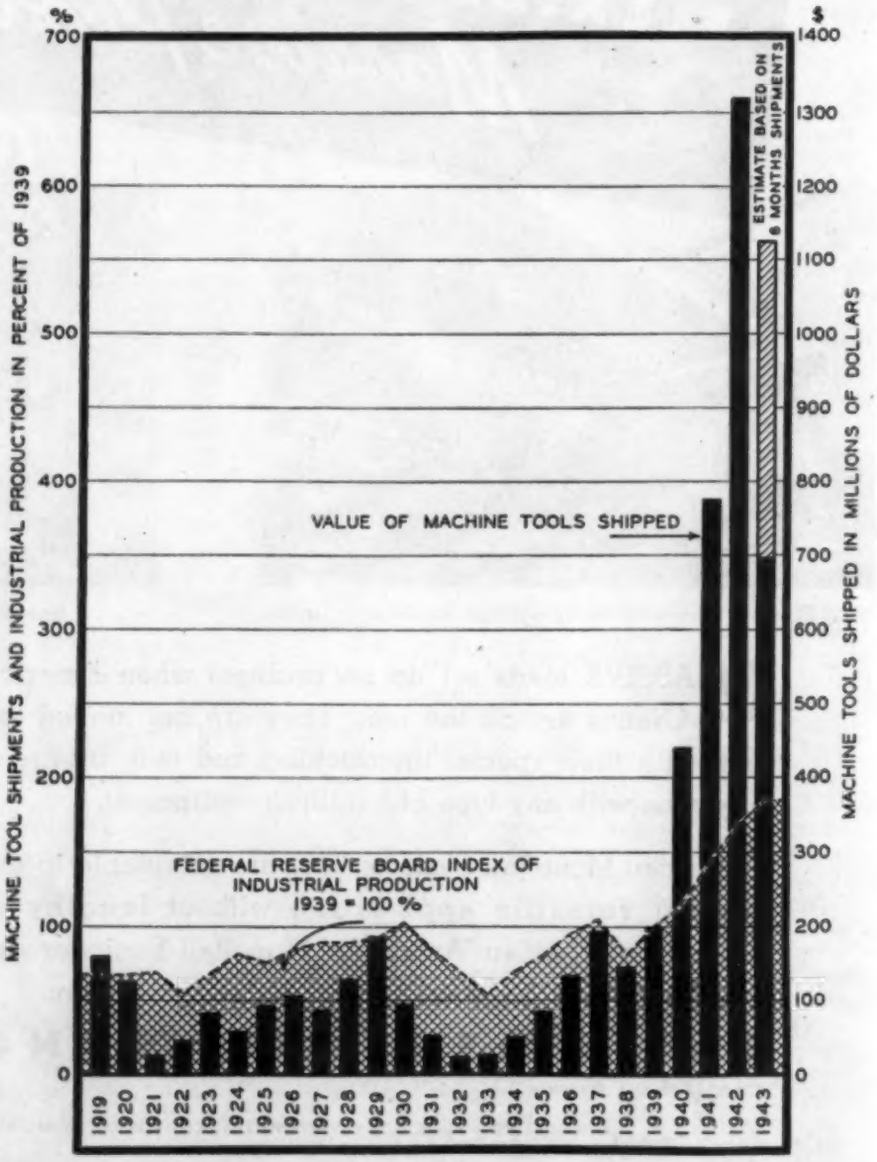
The pamphlet points out that in actual experience the Price Adjustment Board is at once prosecuting attorney, judge and jury, and to a large extent writes its own law.

The machine tool industry consists of some 300 companies which in prewar years seldom had combined annual output valued as high as $200,000,000. Its products have a long life, in some cases being kept in production for 30 years or more. The curve of output, therefore, is a story of sharp, high peaks and broad, low valleys, and in such an industry reserves must be set aside during the "peak" years to carry through the "valley" years, the pamphlet declares.

Pointing out that by the middle of 1939 American tool builders had expanded their plants and were training thousands of new men to supply the needs of the United Nations, the industry says entrance of the United States into the war found the tool builders ready for the job before them.

By Jan. 1, 1942, according to the pamphlet, the industry had invested all of its earnings of the preceding five years —and more—in expanded plants and facilities. Machine tool output was stepped up from $200,000,000 in 1939 to $400,000,000 in 1940, $775,000,000 in 1941 and $1,320,000,000 in 1942. Peak of or-

PEAKS AND VALLEYS OF MACHINE TOOL DEMAND



Tremendous variations in machine tool shipments as compared with general industrial production are depicted in this chart

ders was reached in March, 1942, and peak production was passed in January, 1943. Beginning in February, 1943, output could be permitted to decline gradually, so that by midsummer new machine tool orders ran less than a quarter of the volume the industry was required to build in the preceding year.

"In short," states the pamphlet, "the industry's war job, as concerns the building of machine tools, is almost finished and the industry is even today headed for another of its traditional valleys."

The industry anticipates a great dilemma when war production ceases, declaring American metalworking plants will have installed and ready for operation on their floors more than five times as many new and modern tools as they had in operation in 1929. In the ten years preceding 1939 average annual output of the industry was about 25,000 machine tools. By contrast, in the three years ending in 1943, machine tool builders will have produced about 700,000 machines.

Over 85 per cent of these tools produced for the war are of the same type as those in everyday peacetime use. Because of improvements in design and materials, these tools will be capable of use for 15 years or longer.

"Too Many Machine Tools"

"In short," state the tool builders, "even if our domestic economy should be maintained at top levels during postwar years there are now more machine tools ready and available in America than could conceivably be needed to turn out all of the products required for peacetime purposes for a long time to come."

In the opinion of the committee the outlook for postwar machine tool markets is practically non-existent.

To engage in research and development, redesign, and introduce new models, will take money—money which the tool builders are striving to retain from earnings of the war production period.

Herein, it is held, lies the crux of the machine tool builders inability to agree with the findings of the Price Adjustment Boards. It is contended that the tool builders should be permitted to retain a larger share of their earnings than is needed to be retained by companies whose postwar markets are being built up to new highs through the war period. The Price Adjustment Boards, according to the pamphlet, have proceeded to apply renegotiation indiscriminately throughout the entire war production picture. The tool industry, it says, does not object to the theory of recovery of excessive profits, but it disagrees with the Price Adjustment Boards on the amount of profits to be returned, holding a portion of these profits represent earnings that under other circumstances than war would have been made over the next 10 years or more.

Relative expansion in the machine tool industry has been far greater than in most other industries, it is said, and the excess profits tax exacts a proportionately

(*Please turn to Page* 164)

Plan for Speedy Reconversion

War Production Board reported considering three proposals aimed to amply finance industry's transition from war to peacetime production

THREE proposals which will place ample funds in the hands of war contractors reportedly are under consideration by the War Production Board to aid speedy conversion from a wartime to peacetime economy, Stanley F. Teele, deputy director, Procurement Policy Division, WPB, told a meeting of the Chicago Association of Commerce recently.

Most difficult problem faced is how to free the working capital war contractors have tied up in war production in order that they may be able to get peacetime production under way. Mr. Teele said that dismissal pay for workers, which would tide them over until conversion had been accomplished, probably will be considered part of the cost of the contract in final settlements with the government.

First of the three proposals discussed by Mr. Teele was the plan whereby an automatic advance by the government of 75 per cent of the amounts owed to contractors for materials already produced but not yet delivered or paid for would be made.

He estimated that industry might have claims of from $12,500,000,000 to $19,000,000,000 against the government. Immediate payment of three-fourths of these claims subject to final settlement at a later date would release a great amount of capital for reconversion.

The second proposal outlined by Mr. Teele was government loans to contractors, either directly or in the form of guarantees for bank credit, based upon the payments still owed to them by the government on war orders.

Final proposal under consideration by the WPB, Mr. Teele said, is the outright government purchase of the rights subcontractors have against prime contractors with the price limited to 90 per cent of estimated value of the contracts. This would be practically impossible Mr. Teele told the group. In its place an appeal system should be set up whereby subcontractors may appeal to a government agency if not satisfied with the settlement received from a prime contractor, he declared.

Women Constitute 83% Of New Workers Hired

Women constituted 1,525,000, or about 83 per cent, of the 1,833,000 net total of new workers employed by American factories between April, 1942, and June of this year, states Secretary of Labor Perkins.

In June nearly 2,000,000 women were working in plants producing aircraft and other basic war materials and products. Factories turning out uniforms, tents, and other secondary war products were employing 1,454,500 women at that time.

Urges Postwar Conversion Plan

PROMPT adoption of policies in relation to the conversion from war to peacetime production, which will permit such transitions to be accomplished within the framework of free enterprise at a minimum of dependence upon government loans and prolonged governmental controls, is being urged by the Illinois Manufacturers' Association.

The association's Committee on Industrial Participation in Postwar Planning, headed by Russell G. Creviston, Crane Co., Chicago, states that such policies are essential if extensive dislocation of industry and widespread unemployment in Illinois are to be avoided.

The committee has organized a subcommittee which already is working upon detailed plans to be submitted to Congress and to the various war procurement agencies with recommendations on the subject of conversion. John F. P. Farrar, president, Chicago Metal Hose Corp., Maywood, Ill., has been named chairman of the subcommittee.

Study Shows Few Companies Plan To Scrap War Plants

Survey recently completed by the National Industrial Conference Board reveals that about 63 per cent of the nation's manufacturers have reached definite decisions about using some part of the newly created war plant facilities for peacetime production.

The study brought out the fact that many of the manufacturers are planning to scrap some of their older facilities and use some of the newer buildings and equipment. Companies planning to utilize the new war plants are those producing heavy machinery, metal products, automotive, food and construction materials industries. Some companies reported they hope to make suitable arrangements to purchase some or all of the government facilities under their supervision.

Largest percentage increases in war production facilities were registered in heavy machinery, machine tool, automotive, and electric equipment industries. Two of three companies surveyed had expanded plant capacity with expansion ranging from 5 per cent to 600 per cent.

PRIORITIES–ALLOCATIONS–PRICES

Weekly summaries of orders and regulations, together with official interpretations and directives, issued by War Production Board and Office of Price Administration

INSTRUCTIONS

STEEL FORGINGS: Steel forgings sold by a warehouse are controlled materials, regardless of whether they were produced by a steel producer or by a forging shop. Warehouse orders for forgings must be accompanied by form WPB-2333 (formerly CMP-11). Forgers who receive such warehouse orders may place purchase orders for steel required to fill them or to replace inventory used to fill them, by the same procedure. However, in such cases, the forgers' orders must be identified by the allotment symbol "WH". Such orders shall be considered authorized controlled materials orders.

LEAD: Report of lead inventory, consumption, production and requirements must be returned on or before Sept. 16 in order that the October allocations of lead may be completed in time for October delivery. This report is made on form WPB-95 (formerly PD-66A).

L ORDERS

INDUSTRIAL MACHINERY: Provisions governing food processing machinery, printing and publishing machinery, and woodworking, sawmill and logging machinery have been removed from order L-83 (Industrial Machinery). Limitation orders now covering these types of machinery are: L-292, food processing machinery; L-311, logging, lumber and wood products machinery; and L-226, printing and publishing machinery. (L-83)

HAND TRUCKS: Provisions restricting use of rubber in the manufacture of hand trucks and other handling equipment have been removed from order L-111. However, the amount, type and use of rubber is still governed by rubber order R-1. Portable dough troughs and other specified portable food handling trucks designed for use by the Army or Navy, and laundry truck tubs for use aboard ship when purchased by or for the account of the Army or Navy also are exempted from manufacturing restrictions. (L-111)

STRUCTURAL STEEL SHAPES: Shapes under 3 inches have been eliminated from the definition of "structural steel shapes" under schedule 4 to order L-211. These are considered "bar size" shapes and are no longer part of this schedule. Neither does it cover so-called "special sections." April 1, 1943, specifications as to approved sizes and shapes have been substituted for the earlier ones of May 11, 1942. Delivery of stock shapes is now allowed when orders contain no definite specifications. (L-211)

WRENCHES AND PLIERS: Manufacture of certain types of wrenches, pliers and nippers for the ultimate consumer now is permitted through amendments to schedules II and III of order L-216. Prohibition on manufacture for a producer's inventory or for a distributor's inventory or shelf stock is continued. (L-216)

DAIRY MACHINERY AND EQUIPMENT: Dairy machinery and equipment may be manufactured in a greater number of sizes than heretofore under terms of order L-292 as amended. The order also changes the quota for meat processing machinery from a unit to a gross ton basis; and each manufacturer is limited to producing, for civilian use, the amount of equipment requiring 50 per cent of the annual average gross tonnage of controlled materials he used in 1939, 1940 and 1941. Purchase orders for replacement equipment may be filled under CMP regulation No. 5, if the equipment costs $250 or less and under CMP regulation No. 5A if it costs $100 or less. Users of packing house equipment apply for authorization of purchase orders on form WPB-3155 instead of PD-1A. (L-292)

M ORDERS

RHODIUM: Provision requiring the filing of specific report forms has been eliminated from conservation order M-95 (rhodium). (M-95)

SILVER: Use of foreign silver in manufacture of brazing alloys and solders is prohibited. However, manufacturers may complete processing of any foreign silver already in process, or use up one month's supply of the total foreign silver which was on hand on July 29. Stocks on hand may be delivered to any users for end products not appearing on list B of the conservation order. (M-199)

INDEX OF ORDER REVISIONS

Subject	Designations
Electric Service Lines	U-1-c
Equipment:	
Petroleum Products Handling	P-98-e
Plumbing and Heating Repairs	P-84-a
Iron and Steel	P-68
Machinery, Industrial	L-83
Machinery and Equipment, Dairy	L-292
Rhodium	M-95
Silver	M-199
Trucks, Hand	L-111
Steel Shapes, Structural	L-211
Utility Facilities, Temporary	U-1-g
Wrenches and Pliers	L-216
Price Regulations	
Adjustable Pricing	Sup. Order 53
Automotive Parts	No. 452
Copper, Lead, Zinc	Nos. 15, 69, 81
Manganese Ores	No. 248

P ORDERS

IRON AND STEEL: Producers of iron and steel now may procure capital replacement items up to a value of $2,500 by MRO procedure. Order P-68 has been amended to incorporate the CMP regulation No. 5 procedure with the necessary variations. Periodic reports of MRO used by the iron and steel producers must be made. Restrictions on receipt of MRO materials are set at 120 per cent of the dollar value of 1942. Extraordinary maintenance and repair, such as relining blast furnaces and rebuilding coke ovens (or capital replacements in excess of $2,500) must be specifically authorized and will be given authorization and priorities assistance on a special application form. (P-68)

PLUMBING AND HEATING REPAIR EQUIPMENT: Authority to re-rate orders for plumbing and heating repair and replacement equipment from A-10 to AA-5 without notice or certification from the customer has been granted to the plumbing and heating industries. (P-84-a)

PETROLEUM PRODUCTS HANDLING EQUIPMENT: Individuals who own or rent equipment for handling petroleum products for their own private use have been granted a preference rating of AA-5 and a controlled materials allotment symbol of MRO-P-98-e for the purpose of maintaining or repairing worn-out parts of such equipment. A method is provided for using preference ratings and controlled materials allotments to get materials and repair parts to keep this equipment in good working order. Administration of the order has been delegated to Petroleum Administraction for War. (P-98-e)

U ORDERS

ELECTRIC SERVICE LINES: Use of certain sizes of composite electric conductor is permitted for the construction of rural lines which qualify under terms of order U-1-c, as amended. Small additional amounts of copper also may be used in line construction where this will result in eliminating the need for additional transformers. (U-1-c)

TEMPORARY UTILITY FACILITIES: Construction of temporary utility facilities now is permitted under terms of supplementary order U-1-g. Such extensions must be dismantled within 90 days and the materials returned to inventory. (U-1-g)

PRICE REGULATIONS

ADJUSTABLE PRICING: Uniform adjustable pricing provision, which permits sellers to make sales on the basis of prices in effect at the time of delivery, has been incorporated in the following price regulations, covering building materials: Nos. 40 (Builders Hardware and Insect Screen Cloth), 45 (Asphalt or Tarred Roofing Products), 96 (Domestic Fuel Oil Storage Tanks), 100 (Cast Iron Soil Pipe and Fittings), 175 (Rough-rolled, Figured, Wire and Heat Absorbing Rolled Glass), 206 (Vitrified Clay Sewer Pipe and Allied Products), 224 (Cement), 236 (Heating Boiler Conversion Parts), 261 (Contract Sales of Finishing Builders' Hardware), 272 (Cast Iron Boilers and Cast Iron Radiation), 276 (Asphalt Tile), 317 (Locks and Lock Sets), 382 (Wide Mouth Glass Containers). Under the new provision, a seller may increase his price to the maximum price in effect at time of delivery. However, it does not permit upward adjustment after delivery unless authorized specifically by OPA. When it is necessary to promote distribution or production, and when there is pending a request for change in ceiling prices, OPA may authorize an upward adjustment over prices in effect at the time of delivery, if such action will not interfere with the purposes of the Emergency Price Control act. (Supplementary order 53)

COPPER, LEAD AND ZINC: Price regulations No. 15 (Copper), No. 69 (Primary Lead), and No. 81 (Primary Slab Zinc) have been amended to permit a person to sell copper, lead or zinc at ceiling prices plus the value of the drawback certificate to the purchaser. The regulations are clarified to state clearly that an importer may buy and bring copper, lead or zinc into this country at a delivered cost to him not exceeding the ceiling price plus the import tax or duty on the metal. On copper there is an import tax of 4 cents a pound; on pig lead, 1 1/16 cents per pound of contained lead; and on slab zinc, ⅝-cent. Maximum price for electrolytic copper is 12.00c a pound, delivered Connecticut valley, in carload lots; for common pig lead, 6.50c a pound, delivered New York, in carload lots; and for primary slab zinc, prime western grade, 8.25c a pound, plus freight from East St. Louis to the buyer's receiving point.

Amendments to the lead and zinc regulations, in additional changes, free from price control all purchases of these two metals by the Metals Reserve Co. Purchases of copper by MRC already are exempt. (Nos. 15, 69 and 81)

MANGANESE ORES: Sellers of manganese ores have been authorized to use Atlantic basing points in sales calling for delivery in the area east of the Mississippi river and north of the Ohio river. Maximum price for manganese ore from Atlantic basing points is 90 cents per unit (22.4 lb. of contained manganese), f.o.b. Norfolk, Baltimore, Philadelphia, or New York, plus freight. The Gulf basing point ceiling price is 85 cents per unit, f.o.b. Mobile or New Orleans, plus freight. (No. 248)

AUTOMOTIVE PARTS: Manufacturers of automotive parts have been granted additional time (until Oct. 1) in which to furnish their customers with required price lists, catalogues and notices of resale maximum prices. Price regulation No. 452, which controls manufacturers' prices, requires the manufacturers to furnish this data to their customers by Sept. 3

and a notice that their suggested resale prices, established as the ceiling prices for wholesale and retail sales in price regulation No. 453, have become automatically the maximums. The extension of time was contained in amendment No. 1 to regulation No. 452. Regional offices are authorized to process notices containing proposed new list prices and new non-list prices for rebuilt parts, and requests for exemption from the necessity of establishing new lists for rebuilt parts, and to approve or disapprove such notices and requests. (No. 452)

British-American Combined Conservation Group Formed

William L. Batt, vice chairman of the War Production Board, has announced formation of a Combined Conservation Committee which will work with the Combined Production and Resources Board and the Combined Raw Materials Board.

In February an Anglo-American Conservation Committee was set up in London jointly by the Harriman Mission and the British Ministry of Production. The Combined Conservation Committee reporting to the combined boards (CPRB and CRMB) forms the American counterpart of the Anglo-American committee in London.

The purpose of the combined committee is to correlate the conservation work done in Great Britain and the United States and by the active interchange of information on conservation measures developed in the United States, Canada and the United Kingdom, to bring about maximum saving of materials in the three countries.

The Conservation Division of WPB has worked for several months on an informal basis with the London committee; the formation of the Combined Conservation Committee provides an organization which will carry on this work.

A few instances of accomplishments to date will illustrate the wide field to be covered: At the request of the Combined Raw Materials Board the London committee initiated a study of the use of Iconel in the United Kingdom. As a result, the British were able to reduce 1943 requirements by more than 20 per cent.

As a result of information supplied to the London committee by the Conservation Division of WPB the use of brass for the bases of electric light bulbs made in Britain was discontinued in favor of steel.

The London committee prepared a report on the use of monel metal in the United Kingdom which showed that the British had found alternative materials for some of the uses of which monel metal is put in the United States.

Howard Coonley, director, Conservation Division, WPB, is chairman of the combined committee, and a deputy chairman is to be appointed by the British side of CPRB. The committee's membership provides representation of interested agencies of the governments of the United States, Canada, and the United Kingdom concerned with the procurement and use of materials necessary to the United Nations' war effort.

Special Formula for Pricing Steel Flanges May Be Used Until Nov. 1

Three-month extension is granted in order that needs of shipbuilding program can be met. . . Will permit continued production on a subcontracting basis by persons formerly engaged only in flange distribution

SPECIAL formula for pricing cast steel flanges, forged steel flanges, and flanges made from steel plate, may continue to be used by qualified manufacturers until Nov. 1, Office of Price Administration announced last week.

Use of the special formula, which was provided in amendment 6 to order A-1 of maximum price regulation 188 (Manufacturers Maximum Prices for Specified Building Materials and Consumer Goods Other Than Apparel) on June 7, 1943, was to have terminated Aug. 31.

Need of continued production on a subcontracting basis by persons formerly engaged only in flange distribution, requires the extension of the special pricing program in order that the needs of the shipbuilding program can be met.

Under the special formula, manufacturers are able to price the flanges automatically by applying an 11 per cent markup over the cost of manufacturing each flange. The formula may be applied only where following conditions exist:

1. The sale is made for the ultimate use of the United States government or any agency thereof;
2. Sale is made prior to Nov. 1, 1943:
3. The sale is made by a person who did not engage in the manufacture of such flanges prior to Jan. 1, 1943, and
4. The sale is made by a person who subcontracts one or more of the following operations required to produce a flange: casting, forging, cutting, machining, drilling and spot facing.

The extension was contained in amendment 12 to order A-1 price regulation 188; effective as of Aug. 31.

Changes in File and Rasp Specifications Proposed

Changes in order L-216 to permit the manufacture of certain additional files and rasps for the export market were suggested at a meeting of the Industrial File Industry Advisory committee with representatives of the Tools Division, War Production Board, in Washington.

Members of the committee asked that consideration be given to a proposal to permit the manufacture of various types of files for export that do not appear on schedule V, annexed to order L-216. This request was based on the fact that the files required in certain foreign countries differ from those used in this country.

As a means of reducing the number of sizes of steel that would have to be rolled for files, committee members also suggested further simplification pertaining to file dimensions. Instances where slight changes in file dimensions would bring about this result are half-round files and rasps, hand files, and pillar files. A proposal was also taken under consideration by the Tool Division to revise the provision of schedule V on the length of files for ignition coils.

WPB Facilitates Transfer Of Aircraft Materials

Types of aircraft materials and parts which may be transferred from the inventory of one aircraft manufacturer to another have been broadened considerably by the War Production Board.

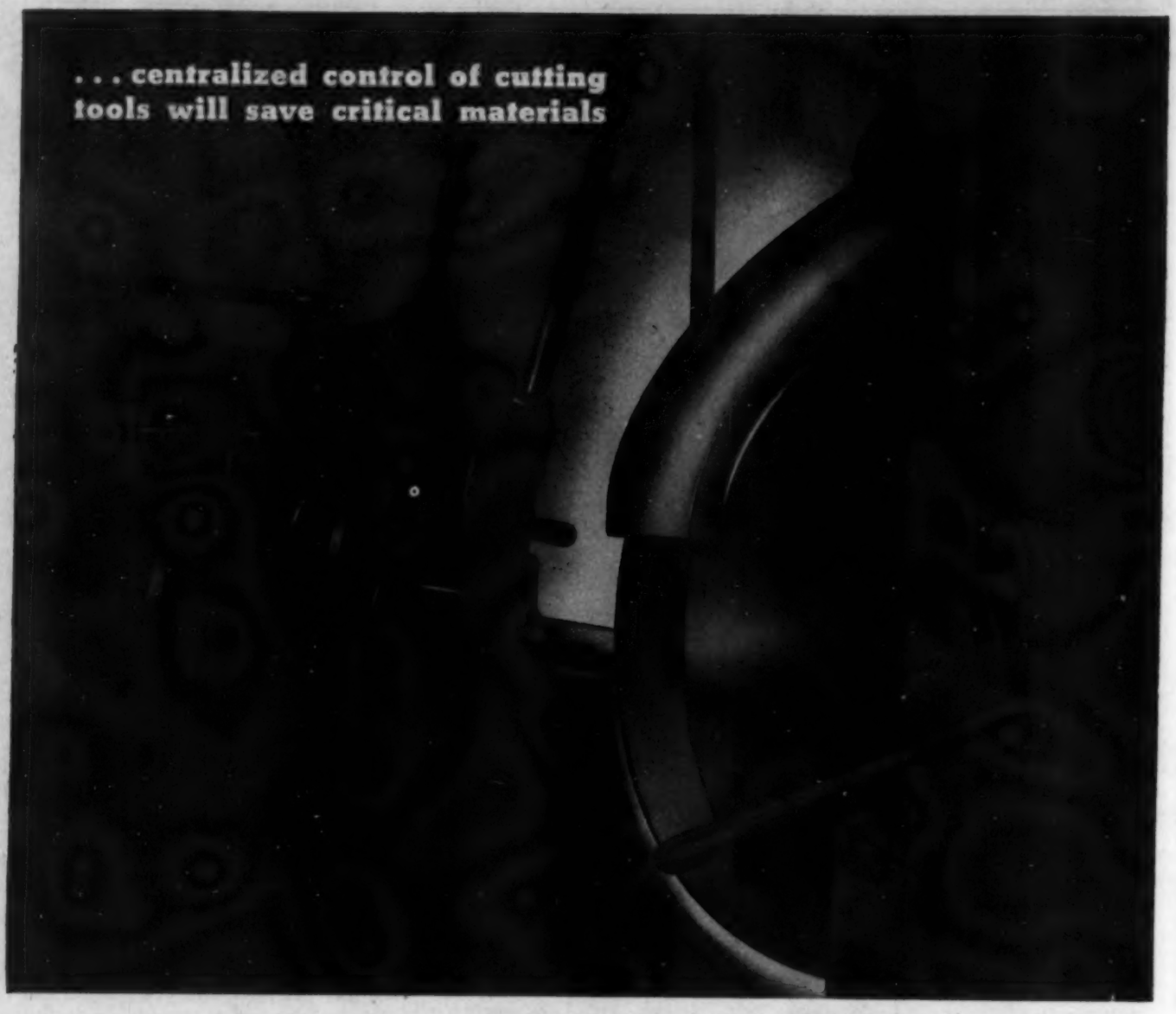
This action was contained in an amendment to directive 16, which places in the hands of the Aircraft Scheduling Unit, Wright Field, Dayton, O., authority to effect transfer of aircraft inventory items.

The original directive was designed to speed the production of airplanes by making it possible to transfer quickly certain items from inventories of one manufacturer to another. It also removed from the effects of priorities regulations 1 and 13 approximately 400 plants primarily engaged in aircraft production and placed them under control of the Aircraft Resources Control Office and the Aircraft Production Board. Through them, the Aircraft Scheduling Unit is given the duty of redistribution of idle and excess inventories of controlled materials.

Among the types of items added by the amendment are: swaged cable terminals, certain aircraft valves and fittings, flexible conduits, switches and circuit breakers, self-locking nuts, resistors, certain bearings, and other items.

WPB May Re-Unite Entire Steel Division

WPB is giving consideration to moving the Ferroalloy Branch of the Steel Division to the Social Security building with the main Iron and Steel Branch. If this is finally decided on it will be the first time since the early days of the war effort that the whole Steel Division has been together. Andrew Leith is chief of the Ferroalloy Branch. John T. Whiting is director of the division while Norman W. Foy is deputy director.



Information supplied by an Industrial Publication

The unnecessarily high casualty rate of single point cutting tools is a phase of speeding up production that needs close attention from management.

One remedy that offers great possibilities is the establishment of a system of centralized tool control.

Such a system would have the obvious advantage of coordinating three most important factors—design, operation and maintenance of cutting tools.

To be effective, design should be based on a knowledge of actual operating requirements, including material being cut and the machine on which the tool is to be used.

Speeds and feeds should be selected from the point of view of economical tool life instead of rate setting. Then operators should be prevented from running tools to destruction, thereby eliminating the necessity for trying to salvage tools that are worn beyond all semblance of their original form.

All worn tools should be redressed in the tool crib by machine according to the drawing. Operators should not be allowed to redress tools by hand to the angles they assume the tool originally had.

CLIMAX FURNISHES AUTHORITATIVE ENGINEERING DATA ON MOLYBDENUM APPLICATIONS.

ARMY E NAVY

MOLYBDIC OXIDE, BRIQUETTED OR CANNED • FERROMOLYBDENUM • "CALCIUM MOLYBDATE"

Climax Molybdenum Company
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MOLY

By A. H. ALLEN *Detroit Editor, STEEL*

MIRRORS of MOTORDOM

Incentive pay plan heads for showdown in contract negotiations between General Motors and UAW. Establishment of scientific program requires large expenditure of personnel, time and money

DETROIT

INCENTIVE pay plans, based on production standards properly evaluated from time study analysis, are rapidly heading for a showdown in discussions between union and management in the current General Motors contract negotiations. As suggested here last week, the UAW-CIO promptly rejected a proposal made by GM that the union lend its support to the institution of such incentive plans as a means of boosting production from 10 to 25 per cent without increasing manpower; in fact the union categorically rejected all 16 proposals made by the corporation concurrently with the incentive suggestion.

The incentive method of pay was branded by Walter P. Reuther, UAW vice president presumed to speak for the GM locals, as leading to a vicious speed-up, cutting of rates, destruction of labor morale, etc.—all utterly poppycock; and he countered with the proposal that the incentive pay plan be made the subject of a debate between himself and C. E. Wilson, GM president. He was probably harking back to the favorable appearance he made in his last debate with Wilson on the late lamented Reuther plan for stepping up war production.

But he did not succeed in throwing General Motors off the scent of what may likely prove to be a hurdle the UAW will never clear—the easily proved desirability of an incentive system, both for workmen and for management.

"Time For Work, Not Words"

"This is the time for work, and not for words," GM spokesmen countered in a statement, adding "the corporation expects to explore carefully the question of incentive pay in its current negotiations with the union, and it hopes to arrive at a satisfactory solution that will increase production and result in better utilization of the available manpower. Failing to do so, the problem will be submitted to the National War Labor Board for hearing. Fortunately, such hearings are now open to the press and the public."

The cold, hard facts are simply these: Years of experience have demonstrated the effectiveness of a proper incentive plan in increasing production. When all workers engaged in the same or similar work are paid the same amount of money, regardless of how much they produce (basic union philosophy) there is a tendency for the production of many individuals to drop down to the level of that of the poorest worker. The average or superior workmen who are physically, mentally and temperamentally capable of doing more work feel that there is no proper reward or recognition for such extra work. General Motors' position is that it would like to reward employes in proportion to their effort and production, and not have them feel that when they produce more work they are being relatively penalized for their interest in their work or for their patriotism.

One principal difficulty in setting up an equitable incentive plan these days—and Reuther might have been a lot smarter if he had centered on this point—is the inordinate length of time and amount of work required to set up production standards which are fair to both men and management. Six months is not too long a period in which to expect such a job to be accomplished efficiently. But with rapidly changing war production needs, an unending flow of design and engineering changes, it becomes next to impossible to develop the necessary time studies and translate them into sound standards before the whole production picture is upset and new studies required.

Importance of unbiased and scientifically built standards cannot be emphasized too strongly. Hundreds of checks on detailed operations by not one but half a dozen trained observers must be correlated and charted before any semblance of a reputable standard can be established. The entire system must be painstakingly explained and "sold" to workmen, union stewards, foremen and other supervisory personnel.

In war, time is steadily running out and it is barely possible that the personnel, time and money which must be expended on incentive systems in many cases may not be worth the candle when measured against output.

A typical case of what happens to a poorly-planned incentive system is that of a small machine shop near Detroit, where the owner decided he would institute incentive pay and figured out what he thought were fair standards. Immediately some of his machinists began earning $250 and $300 a week. They could hardly believe their eyes and were unanimous in agreeing incentive systems were swell. But the owner realized this could not go on very long, so he introduced some new standards which knocked down his machinists' earnings to around $125 a week, still a fair figure. The payoff came when the machinists decided the boss was running a sweatshop and incentive systems were the bunk and quit en masse.

On the other hand, after some two or three years of preliminary study, a wage incentive system in operation at the Ecorse plant of Murray Corp. of America, and now an integral part of the union agreement with the company has raised both wages and "average performance" of workmen better than 20 per cent, and has solved the problem of meeting the competition for labor of other plants in the district.

Train Union Stewards

This plan was developed with the assistance of Stevenson, Jordan & Harrison, management engineers, who at the very start suggested training five union stewards in the technique of making elemental time analyses and setting up production standards. There are 11 basic principles in the Murray incentive bonus system as it now operates:

1. Guaranteed base rate for all workers, for the hours they actually work.
2. Guaranteed standards regardless of how high employe earnings rise.
3. Standards established to permit the average operators to perform at 100 per cent at a normal nonincentive pace—and, when working at an incentive pace, to earn at least 18 per cent in excess of standards over an entire shift period.
4. Standards established in accordance with a time study procedure manual—a copy of which is supplied to every employe.
5. Worker's right to challenge standards through recourse to their union time study stewards.
6. Incentive pay calculated on a daily basis, or, when more than one job is completed within the day's work period, on each individual job.
7. Protection against delays beyond the control of the employe.
8. Incentives established on an individual basis whenever possible, and grouped only when the nature of the operations makes this necessary.
9. Protection against unusual delays in establishing standards on new jobs.
10. Incentives published on a standard hour basis. For all increased effort over and above normal, the worker receives the entire benefit in the form of increased earnings. Increased employe effort is not shared with the company.
11. Incentive payments for indirect or nonproductive workers, based on fair and equitable incentive allowances.

Key to the entire system is obviously a fair definition of "standard normal performance," taking into account such considerations as condition of equipment, nature of production job, personal needs, etc. The standard is developed by time

DEPOT TO CHRYSLER

In furtherance of the policy of the Ordnance Department in turning over management of ordnance depots to private corporations, the Anniston, Ala., depot has been reorganized as the Anniston Warehouse Corp., subsidiary of Chrysler Corp. General manager will be E. C. Row, veteran Dodge and Chrysler executive. The depot's work includes rebuilding and repair of ordnance equipment.

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study observations of many different workers by several time study observers, then translated into elemental time standards. For three months prior to the start of the incentive plan, average performance based on the finally developed standards was 95 per cent. By the end of February of this year it had increased to 103 per cent, and by the end of May to 115 per cent, where it now stands. Failure to move higher is explained by the fact that equipment in general is old and new equipment cannot be obtained; also personnel changes have become increasingly frequent, with some women now taking over jobs formerly handled by men.

The Ecorse plant has been and still is devoted almost exclusively to production of automotive frames, the passenger car type prior to February, 1942, and now truck and jeep frames. Thus the operations are of a fairly standardized character, susceptible to repeated study and analysis. The incentive bonus system covers 758 productive and nonproductive employes, 483 of the former and 275 of the latter. It is now in process of being extended to cover 55 supervisory personnel as well.

Nonproductive workmen—crane operators, press room laborers, car loaders, hoist operators, stock chasers, truck drivers, packers, and a number of other classifications—receive one-half of the combined weekly performance in excess of 100 per cent for the productive departments they serve, plus 5 per cent when their weekly base wage is equal to or less than the established nonproductive standard, plus 0.5 per cent for each per cent saved on the established weekly nonproductive standard. Die setters, inspectors, employes on reoperation, sweepers, scrap cutters and rivet sorters likewise benefit, but on the basis of a percentage of plantwide performance in excess of 100 per cent.

The vast amount of work required in preparation of production standards is readily apparent from a reading of the 103-page manual issued to employes.

To facilitate exchange of information about new problems of employe health and safety arising from increasing employment of women and rehabilitated war veterans in automotive industry plants, a medical panel, comprising factory staff physicians, has been organized by the Automotive Council for War Production. The group's initial action, already under way, is the co-operative study of questions relating to causes of dermatitis, medical standards governing employment of women, special problems of handicapped workers, industrial fatigue and the use of vitamin pills. The panel currently includes seven physicians, but will be expanded to 12.

Bell Aircraft Division Moving to Burlington, Vt.

Ordnance division of Bell Aircraft Corp., Buffalo, N. Y., manufacturing about 40 different types of gun mounts and adapters for aircraft and naval use, is moving to Burlington, Vt., Carl L. Lozon, division manager, has announced. Additional space for expanding production will result.

Beginning in February of this year, Bell Aircraft searched the country for facilities in a community with an adequate labor supply, and Burlington was the ultimate choice. Negotiations for the site chosen—formerly occupied by the Queen City Cotton Mill—began June 7 and were completed recently with the turning over of the property by the DPC. Considerably more than 250,000 square feet of floor space will be available.

A large number of key employes will move from the Buffalo area to Burlington by mid-Septetmber, and it is anticipated that "several thousand" Vermont craftsmen also will be hired.

Bell Aircraft's ordnance work goes back approximately five years to the time when the company was faced with the problem of mounting the flexible 50-caliber machine guns in the YFM-1, or Airacuda plane. Because no gun mount then available would successfully do the job, Bell developed and built its own.

Although production figures are restricted, growth of the ordnance division can be traced from the one type of mount virtually handmade, five years ago, to the present when many hundreds of mounts and adapters in about 40 different types are being turned out every week for fighter planes, bombers, etc.

A lightweight plastic and aluminum aircraft flooring has been developed by engineers of the Glenn L. Martin Co., Baltimore. Made from laminated phenolic sheet reinforced with aluminum alloy strips, the flooring weighs approximately ¾ lb. a square foot less than other types of flooring of equal strength and carrying capacity.

Control Over Bills of Materials Centralized

Centralized control over Bills of Materials has been established by the War Production Board, with the purpose of eliminating duplicate requests for bills which have been made by various claimant agencies, acting independently as they have in the past, Walter C. Skuce, director of the WPB Controlled Materials Plan Division, said recently.

"At the same time," Mr. Skuce said, "rules regarding requirement of materials data have been modified, eliminating the possibility that manufacturers will be called upon to furnish Complete Detail Bills of Materials. In any case where a Complete Detail Bill is required, it will be compiled in Washington from bills available in the various claimant agencies and WPB industry divisions as listed in the central bills of materials index file."

This central Bills of Materials index file will index all bills on class B products and certain class A products which have been obtained by the industry divisions and claimant agencies. Through this index, all bills, except those on highly confidential military items, will be available to any WPB industry division or claimant agency.

Claimant agencies and industry divisions are now instructed to contact the central index file before requesting prime consumers to submit a Bill of Materials on an end product. If a bill is available on the items, the request will not be made. If a bill is not available, the claimant agency will request material information on the class A items involved and a listing of the class B items in the unit terms shown on the official Class B Product List.

MARINE TRACTOR: Equipped with two pontoons in the bow for buoyancy, this vehicle has been designed by Chrysler Corp. for the Army Transport Corps. The steel craft is driven by two 8-cylinder engines, carries two gasoline tanks each with 800-gallon capacity, and burns 12 gallons of fuel an hour at a cruising speed of 14 miles an hour. Acme photo

H-P-M Fastraverse Hydraulic Presses working 'round the clock in war plants throughout the nation are providing the production background for tomorrow's new product era. Their ability to produce more, faster, is expressed in their unprecedented output of parts for planes, tanks, ships, guns and ammunition. Plan now to employ the proven advantages of H-P-M Hydraulic Presses for your metal drawing, forming and forging operations.

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Above H-P-M All-hydraulic Press has 750 ton main ram, 400 ton blankholder and 133 ton die cushion. Pressing surfaces are 144" L-R by 84" F-B. This type of H-P-M self-contained press has an enviable record for deep drawing of large parts from sheet metals. There is a size to meet your requirements.

H·P·M FASTRAVERSE PRESSES

Now on Vital War Work, Point the Way to More Efficient Peacetime Production Tomorrow

WING TIPS

Truman committee indictment of Wright Aeronautical Corp.'s inspection methods retards aircraft engine production. Wisdom of such investigations by political group, lacking technical knowledge, questioned

WHEN senators start telling the world how and how not to build airplane engines, they are venturing into pastures where the bull is apt to be loose, and where they may wind up looking very foolish. Witness the efforts of the inquisitorial Truman committee and its public socking of the Wright Aeronautical Corp. plant at Lockland, O. Their charges constitute a serious reflection on the integrity of one of the oldest aircraft engine builders in the business, as well as upon the honesty and sincerity of the Army Air Forces.

More than this, though, the Truman indictment of Wright had the immediate effect of paralyzing production at the Cincinnati plant which was up well into four figures monthly and better than 70 per cent of the projected peak. It has now dropped an estimated 85 per cent to a level of a few hundred engines a month. The explanation: Supercautious inspection, both by company and air force inspectors, induced by fear of further public condemnation by the Truman committee. Parts are being rejected—or, more accurately, no one will take the responsibility for approving them—because of such vague things as a "poor complexion" on the metal or other vague and unmeasurable defects.

Obvious result is a serious clogging of materials flow since it is geared to a high production rate, an appalling congestion of inspection departments and test facilities with parts and engines and a vast degree of idle productive manpower because of the inspection bottleneck.

More than this, the Truman investigation has had its effect in many other plants building airplane engines, where inspection has tightened up inordinately. Corollary effects on morale of all workmen, to say nothing of the boys flying our military airplanes, can well be imagined. And it requires no great stretch of the imagination to perceive how the various charges of the Truman committee investigating aircraft could be of distinct "aid and comfort" to the enemy.

Lack Technical Knowledge

If any private individuals, or business papers, for example, had come out with an exposition such as the 30-page Truman report, they would doubtless be hauled before the highest military tribunals and drawn and quartered. Yet a Senate committee, staffed by men who know little or nothing of the technical phases of manufacturing or aviation engineering, can broadcast incriminating charges unmolested, and bask in the publicity that follows. It can go so far as revealing the identification of new designs of military planes which industry publications are prevented from even mentioning. Thus, the Truman report discusses the Douglas SB2D Navy dive bomber, the Grumman F6F Hellcat fighter, the Vought Sikorsky TBV torpedo bomber, the Douglas A-26 attack bomber for the Army, and the Northrop P-61 night fighter for the Army.

Nowhere in the entire world are airplane engines built with the care and precision, and subjected to what appears at times a senseless number of tests and inspections, as in U.S. plants, including Wright Lockland. Inspection of incoming materials, parts in process, completed parts, by both company and army inspectors, a "green" test after assembly, complete teardown and inspection by both groups of inspectors, another test run, and a penalty run where a failure may occur during preliminary tests—all this to build an engine which may see only a few hours of service in the air. Probably half the cost of an aircraft engine at least must be charged to inspection and test.

Naturally in all this detailed examination and testing, substandard parts are at times detected. There would be something wrong with the inspection if they were not. But such substandard parts are not necessarily scrap parts; they usually can be salvaged by reworking. However, it seems to be the contention of the Truman committee—and this is the crux of the whole affair—that whenever such a part is discovered, the entire engine should be broken up with sledge hammers and consigned to the scrap heap. The committee, with all its able legal talent, seems utterly incapable of comprehending the difference between the terms "scrap" and "salvage." Someone should buy Mr. Truman a dictionary.

Why Wright's Lockland plant should have been singled out for attack by the committee probably will never be known. It seems reasonable to assume that any other engine manufacturing plant could have been selected and with sufficient probing, cross-examining and vivisection could have been made the subject of a similar withering blast by the committee. It is barely possible that failures of some big Wright engines on the West Coast earlier this year—failures which were proved not to have been the result of defective parts but more likely of design deficiencies—were the needle which persuaded the committee to move in on Wright. Ostensibly, of course, the investigation was brought on by charges of a minor inspector that "leaky" castings were being dipped in a "pink liquid" to seal them, universal practice in sealing aluminum and magnesium castings.

Lockland is one of the largest engine plants in the country, new from the ground up, with the latest types of equipment and materials handling. It was managed, until the recent blowup, by W. W. Finlay, Wright engineering expert who holds a doctor's degree from M.I.T. and who began his industrial career at the age of 14 in a tool shop in England. He instituted a number of novel ideas in personnel relations at the plant which appeared to be paying dividends. One was according employes the privilege to

Inspection, testing, teardown, re-inspection and re-testing constitute a major share of the cost of an airplane engine, which averages around $10 per horsepower

are **on their way** *with* **NEW**

Speed Nuts

Every day bombers and fighters are assembled with more and more SPEED NUTS. The increased use of SPEED NUTS rolls them off the line faster and lightens them for added useful load. These approved self-locking aircraft nuts grip the screws with a DOUBLE SPRING-TENSION LOCK that resists vibration for the life of the plane.

The tons of metal conserved with the use of SPEED NUTS is almost impossible to calculate. And the man-hours assembly time saved runs into millions. Over 1500 shapes and sizes including many new ones just released. Approved for most all non-structural attachments by U. S. Army Air Forces and Navy Department Bureau of Aeronautics. Also used on trucks, jeeps and tanks. Write for our new book No. 185, illustrating some of our very latest developments.

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FASTEST THING IN FASTENINGS!

smoke anywhere in the plant or offices except in a few restricted areas where fire hazards made it unsafe, these being marked off by colored lines on the floor. Unexpected result of this "smoke anywhere" policy was that there was less smoking in general than in plants where the practice is prohibited and where employes have to sneak off to restrooms and washrooms to "grab a smoke." Even in offices where men and women were permitted smoking privileges, tobacco consumption decreased, probably just because there was no rule against it. Human nature is that way.

Employment of negroes has progressed somewhat further at Lockland than at other midwest war plants. One reason is that as the plant expanded, the available labor supply dwindled and negroes were about the only remaining employables. They were hired, carefully schooled and numbers of them upgraded to machine operation and even subforemen. Difficulty of accomplishing this in a plant located on the Ohio-Kentucky line can be appreciated.

As in most cases where a congressional investigating committee digs up what it believes is proof of malfeasance either in public office or in a private corporation, someone's head had to roll into the basket in the Wright case. So, first the Army Air Forces shook up its inspection crew and replaced the chief. Then Mr. Finlay was relieved of his post and he was replaced by a Wright vice president from Paterson, N. J. Reshuffling of company inspectors also followed, in all probability setting the plant back six months on its production path.

It is somehow strange that such gestures of appeasement are considered necessary. After all, here is a pioneer builder of aircraft engines, with a newly equipped plant embodying all the best ideas of skilled experts in the metalworking field, supplying engines to a finicky customer, the Army Air Forces, who with the vast research and testing facilities of Wright Field at its beck and call, should know just about all there is to know about airplane engines. Yet a small committee of legislators and investigators drops in and after a probe which could hardly have been thorough blackballs the plant!

Go Peddle Fish Elsewhere

At first glance, it would appear the thing to do is approximately this: Tell the committee to go peddle its fish somewhere else; that if the best manufacturing brains and the best military brains in the country cannot build a good airplane engine, then certainly no Senate committee can. Inspection and shop practices are outside the province of the Truman committee; the final test is performance of engines in the field of combat, and an Army Investigating Board found no discrepancies in engines shipped from the plant even during the period of alleged faulty inspection.

Instead, however, there is the usual head chopping and personnel shifting, plus some guarded admissions of laxity here and there.

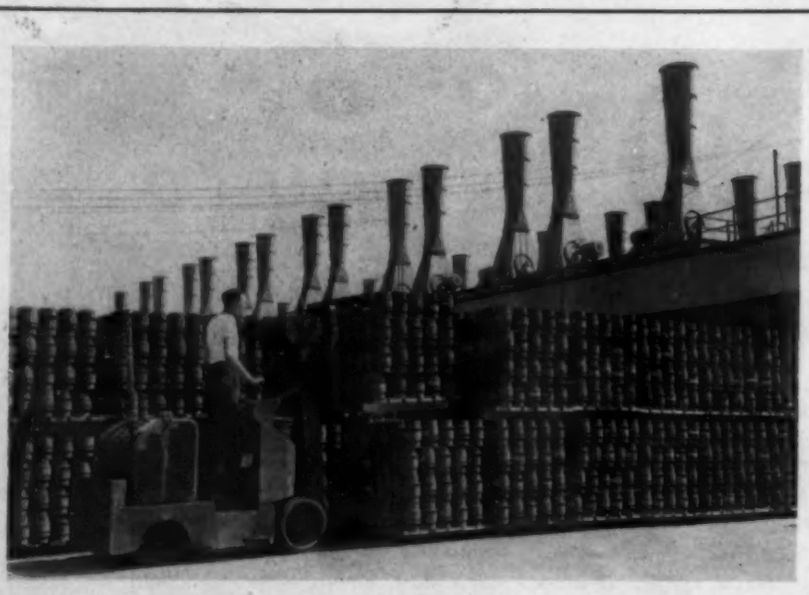
Investigations of government business are healthy things in their proper sphere. In time of war, a certain amount of tact is called for, together with a realization that what on the surface looks to be reprehensible may in fact be only common practice. The aircraft program has received a distinct setback, thanks to the Truman committee.

• • •

Another patent remuneration plan in the aircraft industry has been instituted by the Vultee Field Division of Consolidated Vultee in California. The plan contrasts in some details with that recently announced by Glenn L. Martin Co., Baltimore. Under the Vultee setup employes sign invention agreements as they are hired, and similar agreements are being signed by employes now on payrolls. The agreement provides that the company will attempt to obtain patents on any invention it deems worthwhile, at no expense to the originator.

Cash awards as well as royalties are provided for the inventor. An employe receives $10 if an investigation determines his idea has merit and is patentable; an additional $40 if a patent application is made, and another $50 if the patent is granted.

Additional compensation received from sale of the invention or any part of it, or from any royalties resulting from licensing of the invention, will be paid to the employe on a sliding scale—30 per cent of the first $1000, 25 per cent of the second $1000 and 20 per cent of any additional amount. Proceeds from the patented invention will be paid to the employe throughout the life of the patent, whether he continues to work for the company or not. In the event of the inventor's death, royalties will be paid to his heirs.



HANDLING AIRCRAFT FORGINGS: Gas-electric lift truck picks up a pallet of 160 alloy steel cylinder barrel forgings from yard storage at the Melrose Park, Ill., plant of Buick Motor Division, to move them into the machining department where each 30-pound forging loses about two-thirds of its weight before installation in a Pratt & Whitney 18-cylinder aircraft engine. In the background are some of the exhaust stacks from the engine test cells at the plant. Note blowers on each stack to provide forced draft, necessary since engines in cells drive generators and not propellers which would provide the desired air circulation

Reports Peak Unemployment Not To Exceed 6,000,000

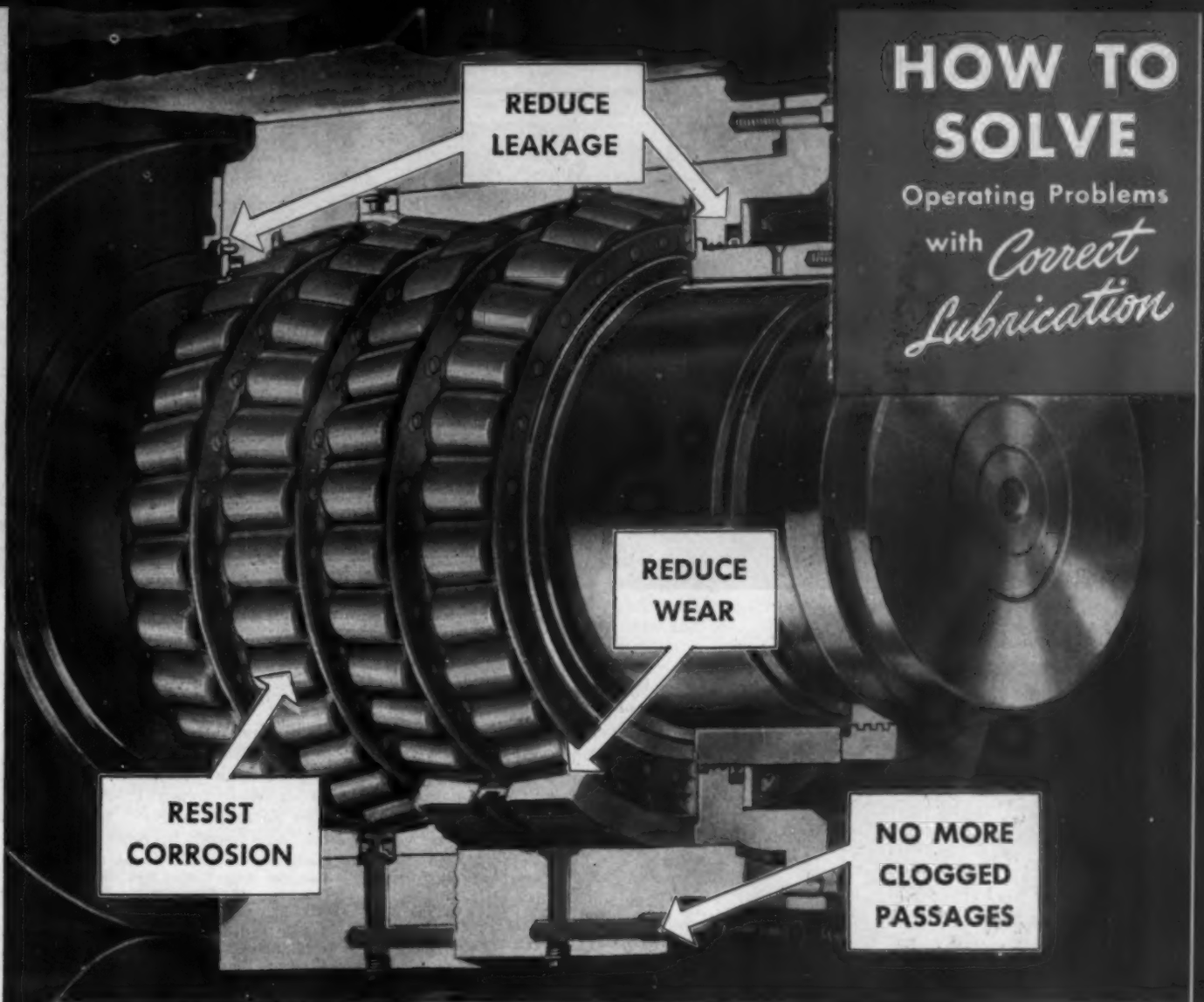
Sudden and successful termination of the European and Japanese phases of the war in 1944 would not cause unemployment to rise above a peak of 6,000,000 in that year, according to *Postwar Service*, issued by the International Statistical Bureau.

Spring and fall cutbacks in production and demobilization of 3,000,000 men by December 1944, will result in re-employment in some of the labor starved industries, A. W. Zelomek, president of the organization, declared. This will prevent unemployment from reaching the alarming estimates of from 12,000,000 to 15,000,000.

He also pointed out that the drop in employment will be taken up to some extent by the shortened work week. About 4,000,000 people are expected to be re-absorbed by industry due to work force retirements. An employment increase of 2,500,000 is expected to occur by December, 1944, in agriculture, transportation, utilities, trade, finance, self-employment, mining and domestic jobs.

ONE OF A SERIES OF SUGGESTIONS TO AID PRODUCTION

ONE OF A SERIES OF SUGGESTIONS TO AID PRODUCTION



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This grease has been extensively tested in service in some of U.S.A.'s largest steel mills. Where it was used formerly experienced wear disappeared. Machine outage time was materially reduced. Production increased.

The importance of this new grease to the steel industry cannot be overemphasized.

GARGOYLE SOVAREX L GREASE HAS THESE IMPORTANT ADVANTAGES:

1. Maximum resistance to softening at high temperature. *Result:* reduced leakage.
2. Resists water. Oil film stays put. *Result:* resists corrosion... prevents wear.
3. Resists separation. *Result:* oil lines and passage are not clogged...bearing failures from this cause prevented.
4. High consistency index. *Result:* permits easy feeding with temperature variations.
5. Extra load carrying ability. *Result:* maximum protection against wear.

GARGOYLE Lubricants

SOCONY-VACUUM OIL COMPANY, INC.— Standard Oil of N. Y. Div. • White Star Div. • Lubrite Div. • Chicago Div. White Eagle Div. • Wadhams Div. • Magnolia Petroleum Company • General Petroleum Corporation of California

USE SOVAREX L GREASE

Chicago Wheel & Mfg. Co. was honored at plant ceremonies (above) held in Chicago when the Army-Navy "E" award was presented by Col. C. J. Otjen. Presentation of employe merit pins was made by Lt. Comdr. E. R. Smith

President G. H. Niemeyer, left, Handy & Harman Co., Bridgeport, Conn., announces to employes that the company has been honored with a third Army-Navy "E" award

Below, a general view of the Army-Navy "E" ceremony of the United States Spring & Bumper Co., Los Angeles, held last month

Additional Plants Granted Army-Navy "E" Awards

Additional industrial plants have won Army and Navy awards for outstanding performance in production, Under Secretary of War Robert P. Patterson and Under Secretary of Navy James V. Forestal, announced. They are:

Cape Ann Tool Co., Pigeon Cove, Mass.
Cayas'er Mfg. Corp., Buffalo, N. Y.
Criterion Machine Works, Beverly Hills, Calif.
Crown Fastener Corp., Warren, R. I.
R. J. Ederer Co., Chicago.
Electrical Connectors & Mfg. Co., Milwaukee, Wis.
General Motors Corp., Aeroproducts division, Vandalia, O., and Delco Appliance division, Rochester, N. Y.
Haber Screw Machine Products Co., Chicago.
Hamilton Mfg. Co., Two Rivers, Wis.
Hathaway Mfg. Co., New Bedford, Mass.
Heller Brothers Co., Newcomerstown, O.
National Enameling & Stamping Co., Milwaukee, Wis.
Remington Arms Co. Inc., Salt Lake City, Utah.
G. F. Richter Mfg. Co. Inc., Queens, N. Y.
Strong, Cobb & Co. Inc., Cleveland.
Tulsa Winch Mfg. Co., Tulsa, Okla.

Sets Up Group On War Housing

Westinghouse Electric & Mfg. Co. establishes advisory and consultation service

CENTRALIZED advisory and consultation service for architects, engineers, pre-fabricators, builders and home owners has been established by Westinghouse Electric & Mfg. Co. with the creation of a "Better Homes Department".

Manager of the new department will be Irving W. Clark, since 1934 associated with housing and household equipment activities at the Westinghouse Electric Appliance division, Mansfield, O. Headquarters of the new department will be in Pittsburgh, it was announced by B. W. Clark, vice president in charge of sales.

Immediate function of the new department will be to co-ordinate company's activities in helping to house war workers. The ultimate objective will be to develop postwar housing markets for the company's products.

The new department will serve as an information center to report on housing equipment production and research carried on in several manufacturing divisions of the company.

National Metal Congress' Plans Nearly Completed

Extensive plans and preparations are being completed for the National Metal Congress and the war conference displays which are to be held under the auspices of the American Society for Metals at the Palmer House, Chicago, Oct. 18-22.

C. H. Mathewson, professor of metallurgy, Yale University, will deliver the Campbell Memorial Lecture. A number of technical papers will be presented during the congress.

Theme of the war production sessions will be increased production of war products, conservation of materials, and postwar conditions. Many manufacturers are planning to display light equipment, blueprints, diagrams, charts, and other items to assist their technical and manufacturing staffs in the conferences.

Associations participating in the congress are the American Society for Metals, American Institute of Mining and Metallurgical Engineers, American Welding Society and Wire Association.

Chemists Hold Fourth War Conference at Pittsburgh

Fourth National War Conference, the 106th meeting of the American Chemical Society, was held in Pittsburgh Sept. 6-11 with about 4000 scientists and industrialists participating.

Some of the subjects discussed at the meeting were manpower problems in the chemical industry, food supply, methods of increasing the productivity of the nation's farms, petroleum research, synthetic rubber, aluminum in the war, vitamins and proteins, industrial hygiene, pilot plants, plastics, fertilizers, and research management in small laboratories.

Other discussions dealt with biological chemistry, analytical and micro-chemistry, cellulose chemistry, chemical education, colloid chemistry, gas and fuel, industrial and engineering chemistry, technology, and physical chemistry.

Dr. P. K. Frolich, president of the society, spoke on "Petroleum—Past, Present and Future".

Iron and Steel Engineers Complete Convention Plans

The largest and most comprehensive technical program ever scheduled will be held in connection with the thirty-ninth annual engineering conference of the Association of Iron and Steel Engineers.

The meeting will be held in Pittsburgh, Sept. 28, 29 and 30, according to F. E. Flynn, president of the association and district manager, Republic Steel Corp., Warren, O.

In keeping with wartime conditions, the conference has eliminated social events and exhibits as in previous years.

BRIEFS . . .

W. K. Millholland Machinery Co., Indianapolis, Ind., has been appointed sales agents in Indiana, southern Ohio and northern Kentucky for the Watson Stillman Co., Roselle, N. J.

—o—

Phelps Dodge Copper Corp. announces it will shortly equip and operate for DPC a large extrusion plant for production of aluminum and magnesium tubes, shapes and rods.

—o—

Buffalo Foundry & Machine Co. has purchased the industrial kettle business of the Sowers Mfg. Co. of Buffalo whose plant and equipment was offered for sale at public auction.

—o—

Caterpillar Tractor Co., Peoria, Ill., announces that production of diesel tractors for military purposes will be increased substantially.

—o—

Sylvania Electric Products Inc. announces acquisition of its fifteenth manufacturing plant, a steel and brick structure in Warren, Pa., which after conversion will be devoted to production of assembly parts for radio tube, lighting and electronic products.

—o—

American Gas Furnace Co., Elizabeth, N. J., announces that Elmer C. Cook and Fred J. Schweizer, formerly sales manager and service engineer of the company, have resigned to form the Cook-Schweizer Co., Elizabeth,, N. J. They will do commercial heat treating work.

They Say:

"Restrictions on the creative genius and productive powers of the American business man and industrialist are infinitely more dangerous to our American way of life and much more likely to cause anemic markets than any other type of regulation. Wartime co-operation and mutual respect between government and industry may be born of necessity but we must see to it that it lasts over into the peace period."—**Emil Schram,** president, New York Stock Exchange.

• • •

"Let us have no more attempts by theorists and planners to use the war as a means of converting our representative democracy to a paternalistic, bureaucratic socialism. The record of the last few years shows that this country doesn't need to be made over."—**Raymond E. Baldwin,** governor of Connecticut.

• • •

"Foreign and domestic demand indicates that postwar business will attain record proportions. The necessary controls, however, must be applied with discretion and understanding. There must be no ceiling upon the successful promotion of business enterprises if we are to achieve full re-employment of the men in the armed services."—**Lawrence Ottinger,** president, United States Plywood Corp.

• • •

"The question of reserves for postwar transition is perhaps the most important single problem now confronting the aircraft industry. Even the most ardent enthusiast cannot see anything but a shrinkage of business in the period immediately following the war."—**Francis A. Callery,** vice president, Consolidated Vultee Aircraft Corp.

• • •

"We in the United States shall continue to rely upon private initiative to supply us with the vast bulk of goods and services which are essential to the well-being of our people."—**Secretary of Labor Perkins.**

MEN of INDUSTRY

R. J. MINSHALL

WILLIAM HEIDGERD

ROBERT T. KELLER

B. M. HORTER

R. J. Minshall has been appointed president, McCulloch Engineering Corp., Milwaukee, succeeding **Robert McCulloch,** founder of the corporation who is resigning as president to undertake a new development. Mr. McCulloch will continue as a director and consultant. Assisting Mr. Minshall, who is also president of Pump Engineering Service Corp., Cleveland, is **James P. Stewart,** assistant general manager.

—o—

John W. Murphy has been named manager of sales, rails and accessories, Bethlehem Steel Co., Bethlehem, Pa., succeeding **Howard E. Stoll,** who has retired after 31 years as manager of rails and accessories sales. Mr. Murphy has been with Bethlehem since 1923, serving in the Boston and Baltimore sales offices, and later acting as assistant manager of sales.

—o—

I. G. Wilcox, former superintendent of parts manufacture, Rockwell street plant, Bell & Howell Co., Chicago, has been appointed general superintendent of the company's Larchmont avenue plant, same city.

—o—

Paul Mayfield, former director of sales, Naval Stores department, Hercules Powder Co. Inc., Wilmington, Del., has been appointed assistant general manager.

—o—

T. Claude Ryan, president, Ryan Aeronautical Co., San Diego, Calif., has been elected president of the Aircraft War Production Council Inc., succeeding **LaMotte T. Cohu,** chairman of the board, Northrop Aircraft, Hawthorne, Calif. **Courtlandt S. Gross,** president, Vega Aircraft Corp., Burbank, Calif., has been named vice president.

—o—

F. B. DeLong has been appointed vice president and general manager of sales, Columbia Steel Co., West Coast subsidiary of United States Steel Corp., Pittsburgh. Mr. DeLong formerly was vice president in charge of sales in the Los Angeles district. He succeeds **J. R. Gregory,** who has been made vice president of sales, Geneva Steel Co., newly formed United States Steel subsidiary at Geneva, Utah.

—o—

William Heidgerd, former director of purchases, Parsons Co., Traverse City, Mich., has joined Follansbee Steel Corp., Pittsburgh, as district sales manager for the Michigan territory with headquarters in the Stephenson building, Detroit. Previously Mr. Heidgerd had been associated with Jones & Laughlin Steel Corp., and United States Steel Corp., Pittsburgh, in sales capacities.

—o—

I. T. O'Brien, for 14 years general production manager, Chrysler Corp., Detroit, has been promoted to special representative on the staff of **Herman L. Weckler,** vice president and general manager. **H. J. Dunn,** former assistant to Mr. O'Brien, has been named general production manager and **W. A. Stickle** has become assistant to Mr. Dunn.

—o—

Herbert A. Goodwin, for the past 15 years advertising manager, Continental Can Co., New York, has been named director of sales development.

—o—

Jacob Betz has been elected chairman of the board, Mollenberg-Betz Machine Co. Inc., Buffalo, and **Harold J. Mollenberg** has been elected president, succeeding his father, the late Henry J. Mollenberg.

—o—

R. C. Cosgrove, vice president and general manager, Manufacturing division, Crosley Corp., Cincinnati, has been named chairman of a special committee on postwar planning, Radio Manufacturers' Association.

—o—

Edward G. Bern, general manager, Hughes Aircraft Co., Culver City, Calif., and **John W. LeDuc,** head of the company's cargo section, have resigned.

—o—

Charles W. MacLean has been appointed manager of the school service department, Westinghouse Electric & Mfg. Co., East Pittsburgh, Pa., succeeding **R. E. Williams,** who will devote his full time to technical and research activities. Mr. MacLean has served as an educator in New York state secondary schools for the past 12 years.

—o—

Robert T. Keller has been appointed works manager, Chrysler Tank Arsenal, Detroit, succeeding M. J. Leonard, who is being detailed to another war job in the corporation. Mr. Keller will serve directly under **E. J. Hunt,** operating manager of the Arsenal.

—o—

B. M. Horter has been named purchasing head for Cutler-Hammer Inc., Milwaukee, succeeding **F. S. Wilhoit,** who has retired after 41 years of service.

—o—

E. F. Schiele, former sales manager and member of the board, Massey-Harris Co., Racine, Wis., has joined the general sales department of J. I. Case Co., Racine.

—o—

A. P. Lancaster has been appointed manager of industrial relations, Hawthorne works, Western Electric Co., Chi-

ROBERT R. RHODEHAMEL

Who has been named general sales manager, National Acme Co., Cleveland, as reported in STEEL, Sept. 6, p. 87

HARRY G. PORCH

T. H. WICKENDEN

cago, succeeding **C. W. Bergquist,** who retired Sept. 1 after 48 years with the company. Mr. Bergquist is a past president of the National Safety Council.

—o—

Harry G. Porch, manager of sales since 1900 in the Boston office of Lukens Steel Co., Coatesville, Pa., retired Sept. 1 after 48 years of continuous service with Lukens.

—o—

A. H. Dettwiler has been elected vice president and secretary of the Cuyahoga Spring Co., Cleveland. Mr. Dettwiler has been associated with the Cuyahoga company for the past 25 years, recently as purchasing agent. **John H. VanUum,** president, has also taken on the duties of treasurer of the company.

—o—

Joseph Birhaum, vice president, Milwaukee Stamping Co., has been elected a director of the Milwaukee County bank.

—o—

J. C. Argetsinger, vice president, general counsel and secretary of Youngstown Sheet & Tube Co., Youngstown, O., has been appointed to the Ohio Postwar Commission by Gov. John W. Bricker. The Commission is studying plans for an extensive "after-peace program" for Ohio.

—o—

T. H. Wickenden, since 1931 assistant manager, Development and Research division, International Nickel Co. Inc., New York, has been appointed manager, to succeed the late Albion James Wadhams. Mr. Wickenden is a member of the American Society of Mechanical Engineers, the Society of Automotive Engineers, American Institute of Mining and Metallurgical Engineers and the American Society for Metals. **H. J. French,** who is serving temporarily in the Steel division, War Production Board, has been named assistant manager of the division. Mr. French has been in charge of alloy steel development since 1932. He is president of the American Society for Metals.

—o—

J. W. Burdick has been appointed assistant district manager, Springfield, Mass., office, Allegheny Ludlum Steel Corp., Pittsburgh, and **J. T. Purtell** has been named salesman in the Springfield district.

—o—

C. A. Hartman, previously foundry superintendent, Harrisburg Machine Corp., Harrisburg, Pa., has joined the metallurgical and engineering service staff of Meehanite Metal Corp., New Rochelle, N. Y.

—o—

E. A. Garber has been named president of Northwest Magnesite Co., Pittsburgh, succeeding **P. P. Moseman,** who is retiring Oct. 31. **C. A. Sargent,** formerly superintendent of mines, succeeds Mr. Garber as vice president and general manager.

—o—

Albert G. DeGraff has been named resident manager in Philadelphia for Austin Co., Cleveland, succeeding **J. C. Childs,** retired.

—o—

Thomas K. Pierce, former general manager, Dominion Plywoods Ltd., Southampton, Ont., has been appointed assistant general manager, Duramold division, Fairchild Engine & Airplane Corp., New York.

HARRY T. WORTHINGTON

Who has joined Beardsley & Piper Co., Chicago, as general manager, noted in STEEL, Sept. 6, p. 86.

OBITUARIES . . .

Leon S. Moisseiff, 70, leading authority on bridge construction and consulting engineer, died Sept. 3 at Belmar, N. J. Mr. Moisseiff was a life member of the American Society of Civil Engineers, and also a member of the American Society for Testing Materials, American Railway Engineering Association, American Welding Society, Alloy Steel Commission and the Structural Steel Welding Committee. He was a consulting engineer in the construction of the George Washington bridge, New York.

—o—

Harry L. Williams, 80, one of the founders of Hickman, Williams & Co., Chicago, died Sept. 2 in Holland, Mich. Mr. Williams served as president of Hickman, Williams from 1913 until 1918 when he retired from active business.

—o—

John Bennett, 68, consulting engineer in this country and England for more than 40 years, and a former vice president of Stevens & Wood Inc., an engineering firm, died recently in New York.

—o—

A. L. Gustin Sr., 65, founder and president, Gustin-Bacon Mfg. Co., Kansas City, Mo., died Aug. 28 in that city.

—o—

Harry C. Tillotson, 76, founder and president, Tillotson Mfg. Co., Toledo, O., died there Sept. 1. The Tillotson carburetor was one of the first workable carburetors developed in the United States.

—o—

W. O. Ingle, 68, vice president and treasurer, Consolidated Machine Tool Corp., Rochester, N. Y., died Sept. 2 after a short illness. Mr. Ingle was widely known in machine tool circles.

—o—

J. C. Bench, 69, superintendent of all mechanical departments at the Minnequa steel plant, Pueblo, Colo., Colorado Fuel & Iron Corp., Denver, died Sept. 3 after 55 years with the company.

—o—

C. W. Waterman Sr., vice president in charge of sales, McNally Pittsburgh Mfg. Corp., Pittsburgh, died in Chicago recently.

—o—

Hugh A. Todd, New York state representative for Hanson-Van Winkle-Munning Co., Matawan, N. J., died recently in Rumson, N. J.

—o—

Franklin D. Johnson, credit manager, Joseph T. Ryerson & Son Inc., Buffalo, died Aug. 28 in Prospect Point, Ont.

—o—

Nelson Blount, 64, retired inventor and research worker for Bell Laboratories, New York, died Aug. 30 in Morris Plains, N. J.

NORTHWEST HITCHES ITSW BRIGHT INDUSTRIAL STAR

Wartime expansion in electric power, steel, metals, aircraft, shipbuilding and diversified manufacturing provides basis for ambitious hopes for economic development of the area in the postwar world

TIME and again announcement has been made of someone advocating construction of an iron and steel plant in the Pacific Northwest. Plans often included a blast furnace and rolling mills. Frequently electric furnace pig iron came into the picture. Some say there is an adequate supply of iron ore; others state the supply is scattered with transportation facilities lacking.

Lately sponge iron processes have been discussed as the logical starting point. G. E. Murphy, president, Portland Spar Co., Portland, Oreg., recently proposed to the War Production Board construction of a northwest steel plant at a cost of $24,365,000. The plant, which would require an estimated 24,000 tons of critical materials, would produce 170,000 tons of pig iron, 200,000 tons of ingots, 75,000 tons of structural steel and plates and 60,000 tons of merchant products, annually. An engineering report showing that Oregon and Washington have more than ample deposits of iron ores of quality especially suitable for making high-grade alloys, was submitted to the board. Use of Bonneville power was contemplated.

Experimental work on sponge iron production is being done at Cascade Locks, about 50 miles east of Portland, Oreg.

In the light of mixed opinion, however, there are certain facts that stand out concerning the failure to launch an integrated steel plant in the Pacific Northwest. For example, past projects have not been engineered properly, tentative investors have been of the conservative type, and those promoting projects in the area have had insufficient knowledge of the iron and steel industry. Consequently, projected plans for an iron and steel industry in the Seattle-Portland area have not made much headway.

Hydroelectric power facilities, however, may change the entire complexion of this region.

Beehive coke was made in the state of Washington as early as 1880 but production ceased in 1936. One by-product plant—the Seattle Lighting Co. —operated 20 Klonne-type by-product ovens primarily for gas from 1917 to 1937. No coke was made from 1937 to 1941.

The only important coking coal resource along the Pacific Coast is in Washington, according to Joseph Daniels, professor of mining and metallurgy, University of Washington, Seattle. This state possesses large resources of coal of various ranks and grades suitable for the need of modern industry, he states. Many of these are not as good quality as coals from mines in the East.

The major production of coking coals is found in the Wilkeson-Carbonado-Fairfax district of the Pierce county field. The beds contain high ash and generally are more difficult to mine and clean. However, Washington coals have been used successfully for various needs, and demands of consumers over nearly a century indicate that they have a place in the field of fuel utilization.

In 1941, the Wilkeson Products Co.

TSWAGON TO R

By JOHN D. KNOX

Steel Plant Editor

created a greatly needed coke industry in Tacoma, Wash. The Northwestern Improvement Co., a subsidiary of the Great Northern railway, undertook development of a coal mine at Wilkeson to provide the coking coal. A battery of 17 Curran-Knowles ovens with a coking capacity of 75,000 tons annually was built at Tacoma and now is in operation on a limited scale pending coal production on the original contemplated scale. Surplus gas is piped about 1000 feet to the plant of the Tacoma Gas Co.

Three different types of coke are contemplated. No. 1 grade containing about 10 per cent ash, No. 2 plant with 12 per cent ash, and No. 3 grade containing 14 per cent ash. While the ash content is higher than in Eastern cokes yet the Washington fuel has the physical properties required by the metallurgical industry.

Meanwhile the ovens are scheduled largely on domestic coke. Later, they will be charged to produce the originally planned grades of low-ash, low-sulphur, and low-phosphorus cokes. These will be taken by the Ohio Ferro-Alloys Corp. making ferrochrome; the Olin Corp., making pig aluminum; and the Pacific Carbide & Alloys Co., making calcium carbide—all at Tacoma; the Electro Metallurgical Co. making ferroalloys at Portland, Oreg.; the Seattle Gas Co., Seattle, for water gas generators; and Bethlehem Steel Co., Seattle, for recarburizing.

Metallurgical charcoal now is being made in Tacoma at the new plant of Coast Carbons Inc., which obtains its supply of wood from nearby lumber mills.

The Pacific Carbide Co., subsidiary of the Stewart-Oxygen Co., has just completed a carbide plant with a capacity of 70 tons per day. It also has a plant in Portland with a capacity of 20 tons per day. This product is used to make acetylene for the shipyards in the area.

Tacoma area has 11 small shipyards and one large yard—that of the Seattle-Tacoma Shipbuilding Corp., which is allied with the Todd interests in New York. The yard turns out an auxiliary aircraft carrier every two weeks for the British. These carriers accompany convoys and have been effective in submarine warfare. They also are used in carrying fighter planes across the seas. About 28,000 men are employed locally in the shipyards.

The Olin Corp., E. Alton, Ill., owner of the Winchester Arms Co. and the Western Cartridge Co., is operating the 40,000,000-pound aluminum plant at Tacoma, turning out a product 99.75 per cent pure. The plant was designed by Asbjorn Sjolie, a Norwegian, who has built plants in China, Spain, Manchuria and other countries.

The Hooker Electrochemical Co. is making aluminum chloride in a new $250,000 addition at its plant in Tacoma. The product finds its way into high octane gasoline.

Power Output Vast

Cheap power and an adequate supply contributed largely in getting five aluminum reduction plants, three ferroalloy plants, two calcium carbide plants and one magnesium plant to locate in the Pacific Northwest. Some idea of the vast quantity of power available from the Grand Coulee and Bonneville stations in the Pacific Northwest can be had from the following comparison:

Station	Annual output kilowatts
Niagara Falls	1,200,000
Boulder Dam	1,300,000
Tennessee Valley	1,900,000
Columbia River	2,700,000*

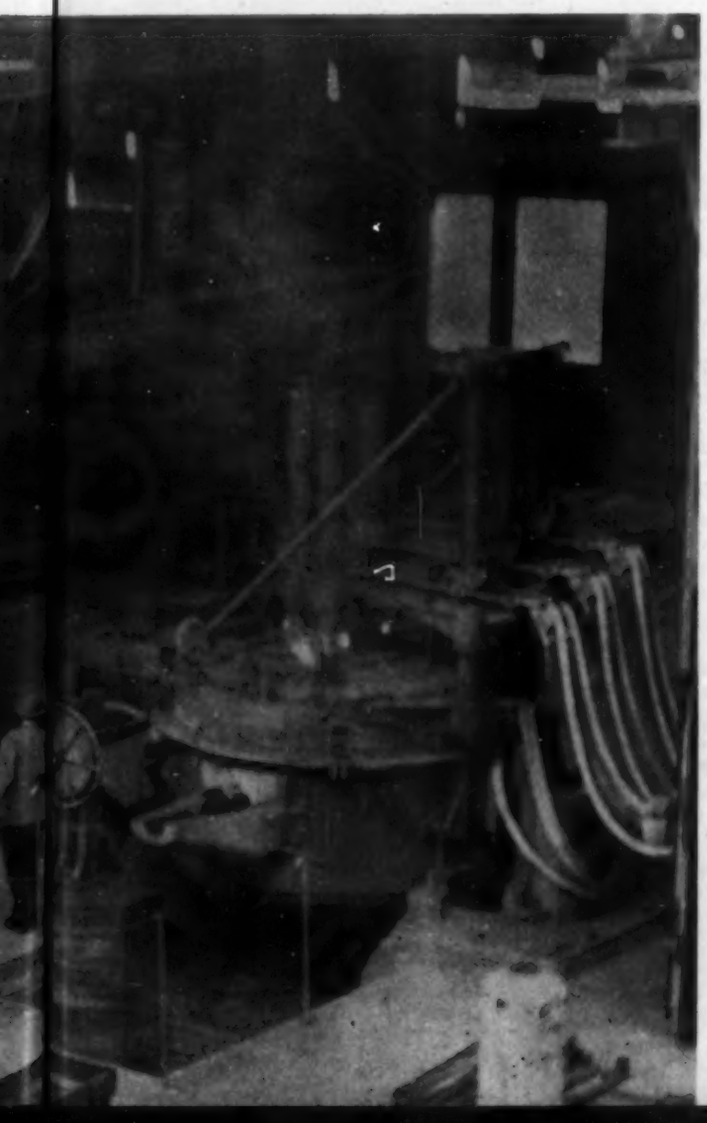
*Representing present capacity. Completion of future dams and stations will bring total capacity to 13,000,000 kilowatts.

The aluminum plants are located at Portland, Oreg., and at Vancouver, Longview, Tacoma and Spokane, Wash. Some are company-owned; others are financed by the government but privately operated. The five plants have an annual production of 596,000,000 pounds of aluminum pig which is equivalent to 25 per cent of the nation's output. In addition, a 4-high continuous mill has been built at Spokane, Wash., with annual capacity of 24,000,000 pounds of sheet aluminum, as well as a magnesium reduction plant with annual output of 48,000,000 pounds.

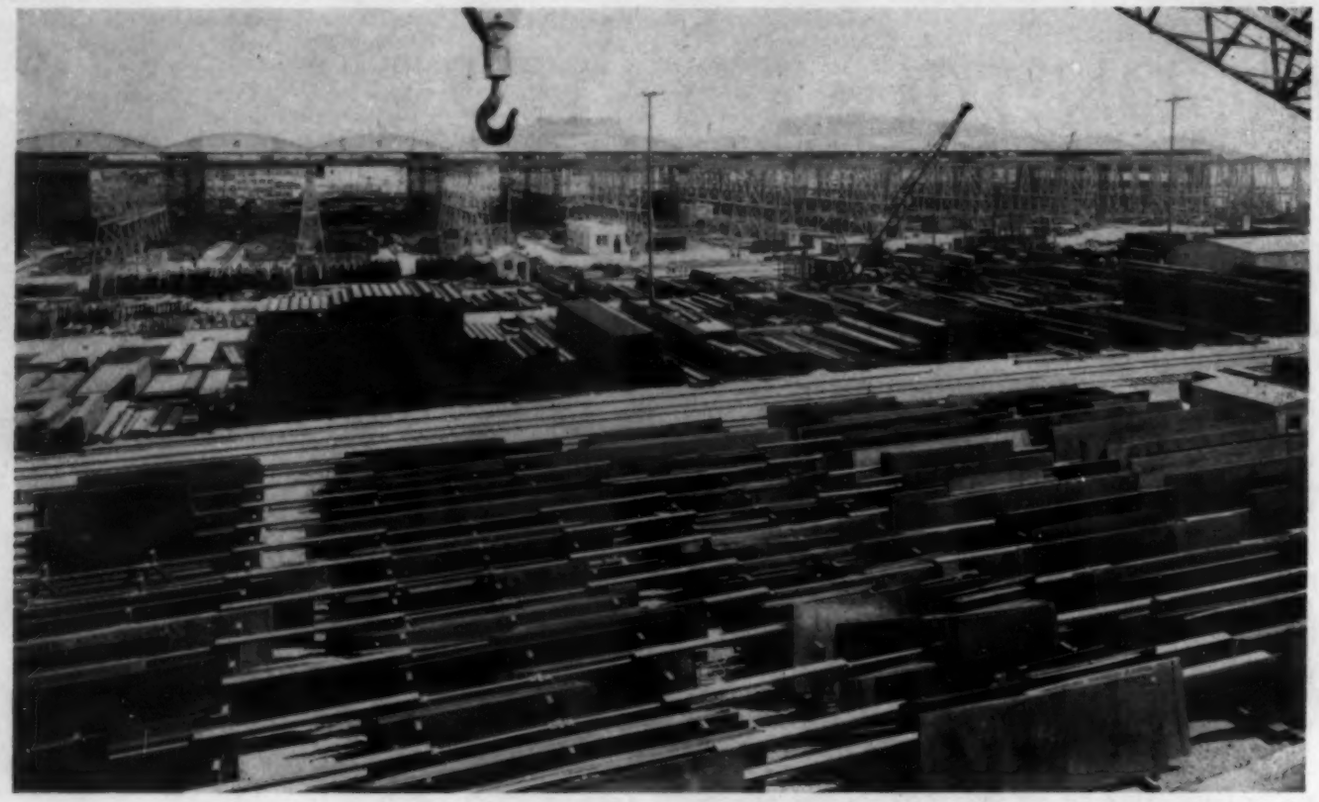
Large deposits of magnesite located in northeastern Washington are available for the manufacture of magnesium. Investigation of aluminum-bearing clays for possible use in manufacture of aluminum is being made in Washington.

Considerable promise is held for the electrometallurgical industry on the Pacific Coast because of cheap power originating from government-owned power stations on the Columbia river. No area in the east offers such low power rates at Tidewater as those in effect at Seattle and Portland. In fact, there is no setup in the world that can match power conditions in the Pacific Northwest.

Cheap power along with an ample sup-



New melt shop of the Pacific Car & Foundry Co., Seattle, Wash., area. Melting equipment includes two 25-ton electric furnaces



Sectional view of steel yard of Oregon Shipbuilding Corp., Portland, Oreg. The covered assembly shop is shown in background

ply of scrap from shipyards has led many to voice the opinion such a setup is ideal for establishment of a steel industry on a modest scale in the Pacific Northwest. In fact, such a start has been made at Portland, Oreg., where the Oregon Electric Steel Rolling Mills Inc. recently completed a plant. The melt shop has two 15-ton Lectromelt furnaces with annual output of 60,000 tons. Scrap is obtained from nearby shipyards at an average price of $13.50 per ton. The rolling mill department includes a 20, 14 and 9-inch train which was purchased from the General Cable Co., Baltimore, and a Morgan cooling bed. Merchant bars and shapes are products of the mill.

Electric melting capacity at plants in the metropolitan area of Seattle also has been stepped up. The Isaacson Iron Works has installed two 25-ton Lectromelt furnaces with annual capacity of 72,000 tons of forging ingots and Northwestern Steel Rolling Mills Inc. one Lectromelt furnace for ingot production. Incidentally, this latter company which has been making electric furnace steel since Jan. 1, 1927, has the cheapest power cost of any electric furnace shop in this country. Its rate is 4 mills per kilowatt hour for all current used during December, January and February of each calendar year and 3 42/100 mills per kilowatt hour for all current used during the months of March to November, both inclusive.

At Renton, Wash., about 12 miles south of Seattle, the Pacific Car & Foundry Co. installed two Lectromelt furnaces for production of steel castings. Incidentally, this company has just completed one of the most modern foundries on the Pacific Coast. Wide aisles, modern lighting, large heat treating furnaces with pyrometric control and modern foundry equipment are some of the features of this steel foundry whose output is devoted to war materials.

Open-hearth steel output of the Seattle works of the Bethlehem Steel Co. has been boosted to 177,000 tons by the recent addition of a 40-ton furnace which gives the company a 5-furnace shop. This is the only open-hearth steel plant in the Pacific Northwest. The furnaces operate on a charge of 90 per cent scrap and 10 per cent pig. Products of the plant include structural shapes, universal plates, splice bars and tie plates, and merchant and concrete bars.

Not Over-Expanded

Potential scrap requirements of Pacific Northwest consumers this year including Isaacson, Pacific Car, Oregon Electric Steel, Bethlehem, Northwestern Steel Rolling and electric steel casting furnaces in Washington and Oregon amount to 410,000 tons. In addition gray iron foundries in the entire Northwest area are currently consuming at the rate of about 72,000 tons annually.

Growth of the iron and steel industry in Seattle has been considered healthy. No effort has been made to over-expand producing facilities. Major shops have been converted over to war production to take care of demands from shipyards, and manufacturers of aircraft and tanks. The most substantial and highly important expansion programs have been in heavy forgings for ship propellers and drive shafts, and in the cutting and machining of heavy gears.

Some plants formerly engaged in the manufacture of refrigerator freight cars and other heavy transportation equipment, turned their producing facilities over to the manufacture of 30-ton tanks. After the war, operators of these plants are considering converting their shops back to peacetime pursuits, having in mind manufacture of various types of machinery, trucks and truck trailers, and railroad equipment.

Mention of Seattle in late years invariably has brought to mind the "home of the Flying Fortress" which is giving such a good account of itself in the war. Boeing officials are looking for great advancement after the war in the field of commercial aircraft. And because of the wide experience of this company in the manufacture of clipper ships and other large aircraft, many industrialists believe this company will play an important role in the large-scale development of commercial aircraft when the war ends. Already studies are being made on cargo and clipper planes. The Boeing company has two plants in Seattle, one employing more than 30,000 workmen and the other about 16,000.

Seattle as a shipbuilding area claims 44 large and small yards. After the war many of the shipbuilding executives are planning to share in the work of building up and servicing our merchant marine.

Seattle has become a more predominant manufacturing city as indicated by the number of employes working in

the manufacturing and mechanical industries. Approximately 100,000 people are identified with these industries or 40 per cent of the total employment in Seattle. This is double the number in normal times.

The federal census in 1940 gave the Seattle metropolitan district a population of 452,639; by January 1943 it was estimated to be 580,000. This increase is cited merely to strike home the fact that the Pacific Northwest is undergoing drastic change. It is the story of shifting population. People from the hinterland have come to coastal cities by the thousands and they have no intention of returning to their former homes when conditions become normal.

The general manager of one of Seattle's steel plants is authority for the statement fully 90 per cent of the employes who have become identified with his company within the past two years are either purchasing homes or are planning to take up permanent residence in Seattle. An executive of another industrial plant nearby used this same percentage in connection with newcomers at his plant. And such intentions on the part of various migrants is by no means applicable solely to this section; the feeling is general all over the Pacific Northwest.

The importance of this shift in population, therefore, must not be minimized for it represents a change from an agricultural people to a people now making a livelihood in industry. They are becoming an industrial folk.

All along the coast there is a modest real estate boom in most communities. Many city folk are going into retirement leaving the larger towns to war workers, with the result there are many residences changing hands. The so-called beach communities are becoming small, self-sustaining towns in their own rights. The presence of Coast Guard and Army groups has strengthened the self-sustained position. Some of the service men have moved their families to the coast to stay permanently.

That is why industrialists view the future of the Pacific Northwest with great optimism. The influx of Americans in that area promises markets and this in turn means spinning factory wheels. So that considerable demand for goods has been transferred from the hinterland to the coastal cities and this may compel underbuilt industrial areas to spread their wings—all of which means more steel.

Consideration also is being given to various countries whose shores are washed by the Pacific ocean and whose after-the-war purchases appear highly promising. Millions of these people in far off places have seen American soldiers set up their make-shift stoves in these out-of-the-way places and will desire similar comforts. Then, too, industrialists up and down the coast feel that the trail of destruction in the Far East will call for a large amount of manufactured goods.

China Promising Market

Industrialists on the coast feel that the United States has the opportunity to co-operate with China—not exploit it—after the war. The door is open for us to take iron ores, chrome, tungsten, etc., from the Chinese and give finished goods in exchange. But the opinion also is voiced that Russia is poised like a big question mark. One of the questions to be answered is, "How extensive is Russia's industry back in the Urals and what postwar plans has she to capture Chinese trade?".

Intense thought is being given to trade in the Orient in the postwar era. Before the war the machinery business and the iron and steel market in the Far East were controlled either directly by the Germans or indirectly by German money. Plans are being considered to forestall any move on the part of the Germans to reccapture this business. Some have gone so far as to suggest that not only plants be moved to China but operating crews as well. Some plants in the Pacific Northwest while built for present wartime needs were also erected with an eye to the future economic pattern so that transfer from the coast to China can be consummated with a minimum of confusion.

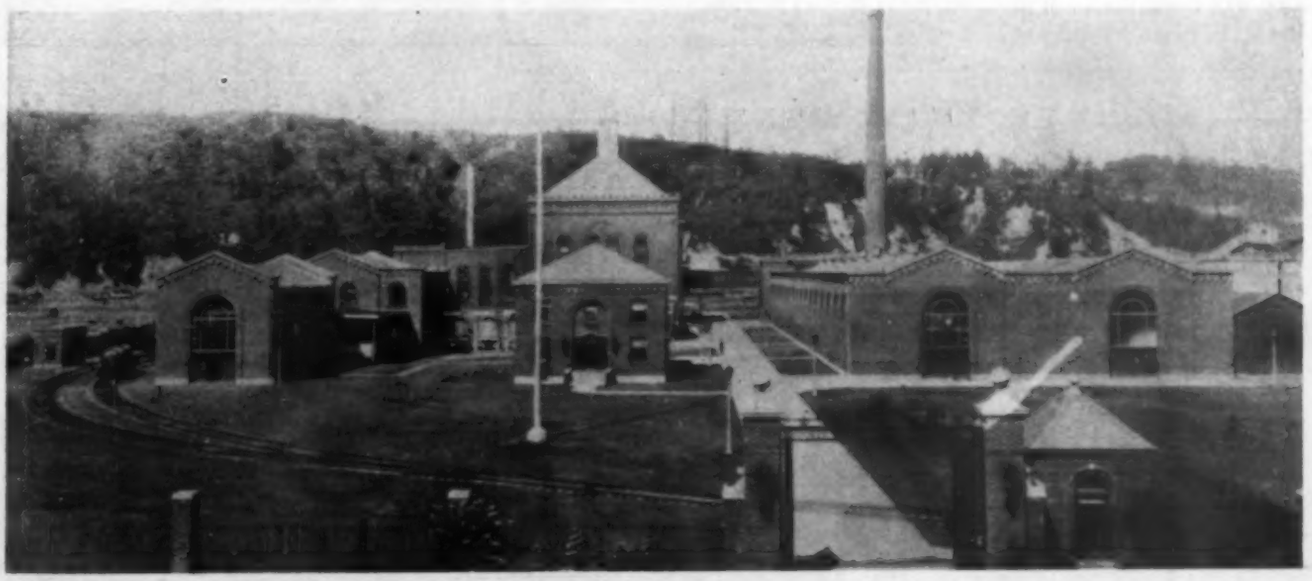
Then there is Alaska which, many believe, holds considerable economic promise in the postwar picture. The opinion is gaining weight that the wealth in this part of the country is untapped and the possibilities untouched. Once our people get a glimpse of that land from the recently built highway they will experience a pull to take up residence there. Pacific Coast industralists expect a great expansion in Alaska and plans are being considered to build large barges and tugs to handle shipment of goods in that direction.

Postwar plans also include a large fleet of vessels for taking care of coastal trade as well as off-shore shipments westward. Shipyards are available for building such a merchant marine and steelworks and rolling mills at Fontana, Calif., and Geneva, Utah, soon will be sending out material in demand by shipbuilders. Moreover, it is felt that bulky materials, such as lumber, and other products can be shipped to the Far East and cheap scrap brought back from the battlefields for consumption in basic open-hearth furnaces located close to the Pacific coast.

Ivan Block, chief, Market Development Section, Bonneville Power Administration, Portland, Oreg., in speaking before the Progressive Business Men's Club

(*Please turn to Page* 166)

Plant of the Hooker Electrochemical Co., Tacoma, Wash. Recent expansion provided facilities for making aluminum chloride



THE BUSINESS TREND

Going Getting Tougher as Operations Near Capacity

WHILE the various industrial production indexes continue to fluctuate from week to week, reflecting developments closely related to prosecution of the war, as a general thing the trend holds upward though advances are being scored with increasing difficulty as facilities more nearly attain capacity operations.

Shortage of manpower is probably the most critical problem now confronted. Material shortages continue a factor hampering output in some directions, but under Controlled Materials Plan, raw material supply problems are less of a handicap retarding operations than formerly was the case.

Steel output rose a half point to 99 per cent in the latest weekly period. Consumption of electric power again established a new high, and output of bituminous coal increased 27,000 tons on a daily average basis.

Seasonal shutdowns for inventory cut automobile and truck production in the week ended Sept. 4, but normal rate of assembly has now been resumed.

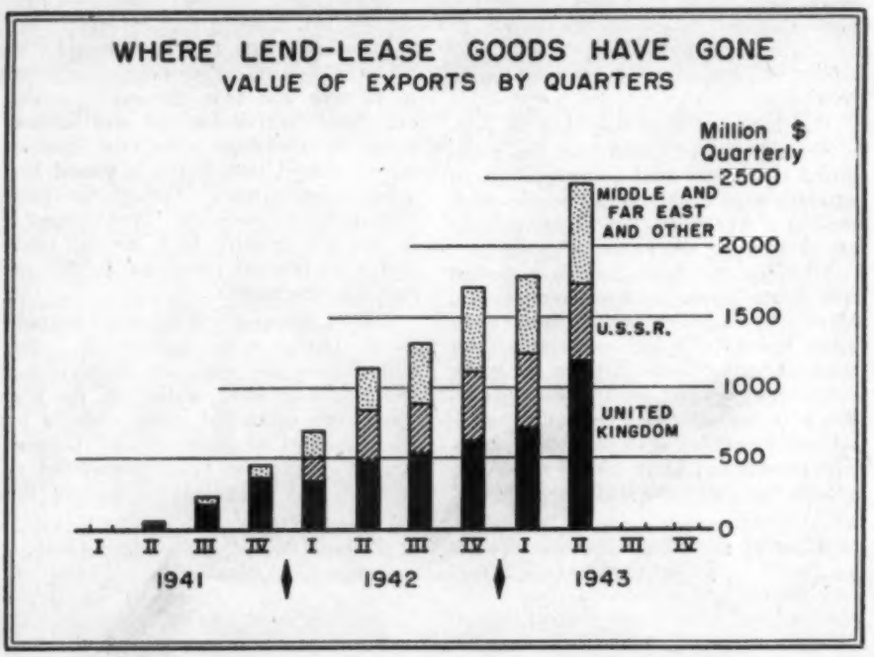
LEND-LEASE—Report to Congress shows $14 billion spent for lend-lease operations since the act was passed slightly over two years ago, or approximately 12 per cent of the nation's war cost thus far. For the year ended June 30, lend-lease needs absorbed 17 of every 100 American bombers, 25 of each 100 fighter planes, 22 of every 100 light tanks, and 36 of every 100 medium tanks. Russia has received more lend-lease planes from us than any other nation.

A breakdown of the $14 billion in lend-lease items is as follows: Munitions, 50 per cent; industrial products, 21 per cent; food and other agricultural products, 14 per cent; shipping, ship repairs and other services, and construction of plant facilities in this country, 15 per cent.

Lend-lease requirements are constantly shifting. For example, about 250,000 tons of finished and semifinished steel purchased for Russia had to be redistributed to other lend-lease countries, for two reasons: The shipping space was needed more urgently for the Soviet Union's food cargoes, and the Russian army's shift to the offensive lessened the need for a large consignment of barbed wire included in this order.

FOUNDRY EQUIPMENT—Sales of foundry equipment and of gears hit their wartime peaks in the spring of last year. Foundry equipment orders, while declining from the high totals of early 1942, during the current year have held reasonably near an index figure of 400. Compared with a year ago the trend in gear sales has recorded a substantially better showing than that of foundry equipment orders.

COKE PRODUCTION—Quick recovery from the effects of the recent coal strike is evidenced by the July daily average by-product and beehive coke output of 189,889 net tons, an increase of 3.9 per cent over the June figure. By-product coke held by producers on Aug. 1 totaled 866,253 tons, or 23,722 tons more than at the start of July. Stocks of coking coal at by-product plants Aug. 1 were sufficient for 28 days' needs at the July consumption rate.



FIGURES THIS WEEK

INDUSTRY	Latest Period*	Prior Week	Month Ago	Year Ago
Steel Ingot Output (per cent of capacity)	99.0	98.5	98.0	98.0
Electric Power Distributed (million kilowatt hours)	4,326	4,322	4,240	3,583
Bituminous Coal Production (daily av.—1000 tons)	2,013	1,986	1,983	1,917
Petroleum Production (daily av.—1000 bbls.)	4,235	4,106	4,202	3,682
Construction Volume (ENR—unit $1,000,000)	$40.6	$41.6	$41.2	$217.8
Automobile and Truck Output (Ward's—number units)	15,350	20,035	20,130	16,865

*Dates on request.

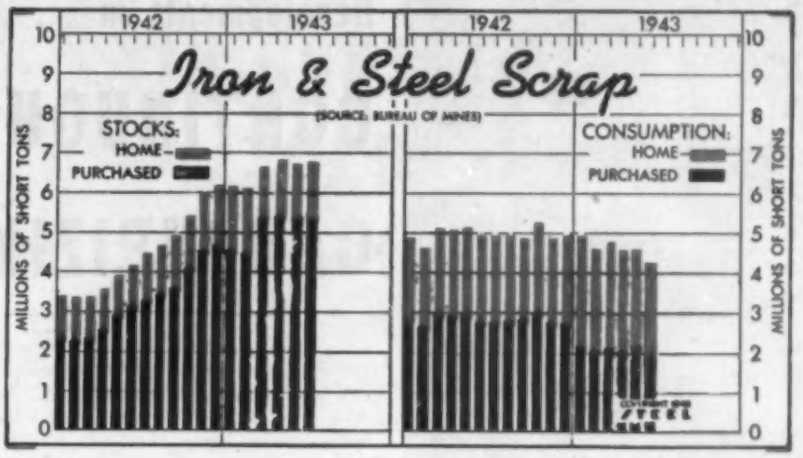
TRADE				
Freight Carloadings (unit—1000 cars)	897†	904	890	814
Business Failures (Dun & Bradstreet, number)	45	45	50	141
Money in Circulation (in millions of dollars)‡	$18,571	$18,303	$17,706	$13,250
Department Store Sales (change from like week a year ago)‡	+15%	+4%	+20%	−3%

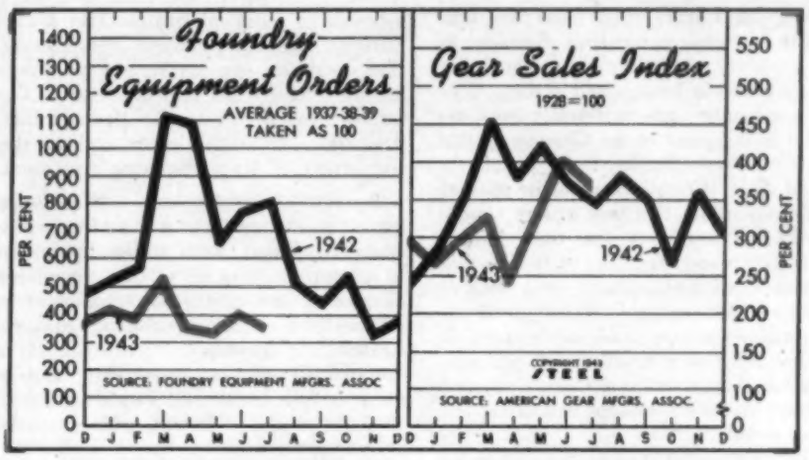
†Preliminary. ‡Federal Reserve Board.

Iron and Steel Scrap
Bureau of Mines

(Gross tons—000 omitted)

	Consumers' Stocks		Total Consumption	
	1943	1942	1943	1942
Jan.	6,233	3,503	5,031	4,956
Feb.	6,209	3,455	4,680	4,708
Mar.	6,850	3,460	4,787	5,221
Apr.	6,918	3,582	4,642	5,156
May	6,905	3,972	4,723	5,225
June	6,916	4,297	4,493	5,000
July	.....	.....	4,579	5,006
Aug.	.....	.....	4,780	5,015
Sept.	.....	.....	4,993	4,955
Oct.	.....	.....	5,530	5,342
Nov.	.....	.....	6,078	4,930
Dec.	.....	.....	6,274	5,037
Total	.....	.....	54,503	60,551





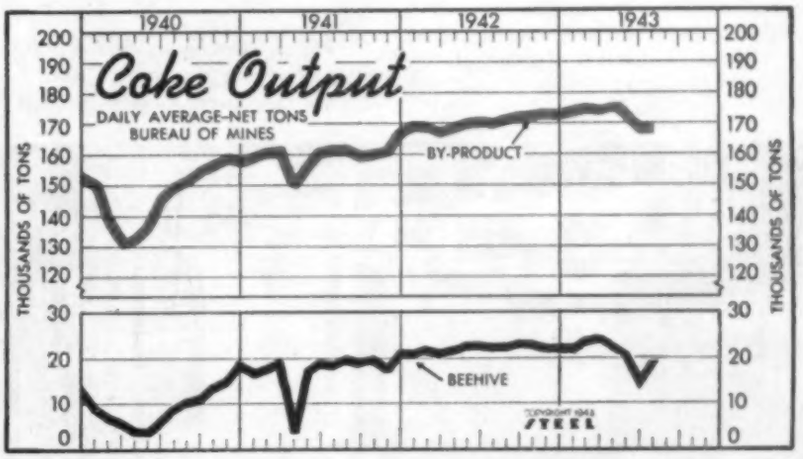
Foundry Equipment and Gear Sales

	Monthly Average (1937-38-39=100)		Index (1928=100)	
	1943	1942	1943	1942
Jan.	429.8	532.7	268	288
Feb.	399.5	567.9	303	353
Mar.	562.7	1122.4	334	455
Apr.	562.7	1089.3	240	378
May	348.9	653.6	342	421
June	413.6	774.0	401	373
July	379.4	800.8	374	344
Aug.	.....	510.8	...	380
Sept.	.....	446.4	...	351
Oct.	.....	540.6	...	263
Nov.	.....	338.8	...	359
Dec.	.....	382.5	...	306
Year	.....	646.7 Ave.	...	355

Coke Output
Bureau of Mines

(Daily average—Net tons)

	By-Product		Beehive	
	1943	1942	1943	1942
Jan.	174,044	168,508	21,440	20,874
Feb.	175,107	168,414	23,991	21,771
Mar.	175,051	167,733	24,369	21,032
Apr.	175,857	168,960	22,932	21,843
May	174,240	170,187	21,270	22,571
June	168,735	170,593	14,055	22,487
July	169,936	170,400	19,953	22,300
Aug.	.....	171,443	.....	22,333
Sept.	.....	172,110	.....	23,106
Oct.	.....	172,211	.....	23,148
Nov.	.....	173,029	.....	22,106
Dec.	.....	173,163	.....	22,000
Average	.....	170,549	.....	22,122



FINANCE

	Latest Period*	Prior Week	Month Ago	Year Ago
Bank Clearings (Dun & Bradstreet—billions)	$7,740	$7,446	$8,612	$6,882
Federal Gross Debt (billions)	$148.0	$147.6	$144.4	$86.3
Bond Volume, NYSE (millions)	$30.4	$28.6	$61.8	$45.4
Stocks Sales, NYSE (thousands)	2,579	2,698	4,714	1,546
Loans and Investments (millions)†	$46,719	$47,040	$46,822	$34,504
United States Government Obligations Held (millions)†	$34,209	$34,574	$32,287	$20,564

†Member banks, Federal Reserve System.

PRICES

STEEL's composite finished steel price average	$56.73	$56.73	$56.73	$56.73
Spot Commodity Index (Moody's, 15 items)†	246.8	246.9	244.2	231.0
Industrial Raw Materials (Bureau of Labor index)‡	112.8	112.7	114.0	100.8
Manufactured Products (Bureau of Labor index)‡	100.0	100.0	99.6	99.2

†1931 = 100; Friday series. ‡1926 = 100.

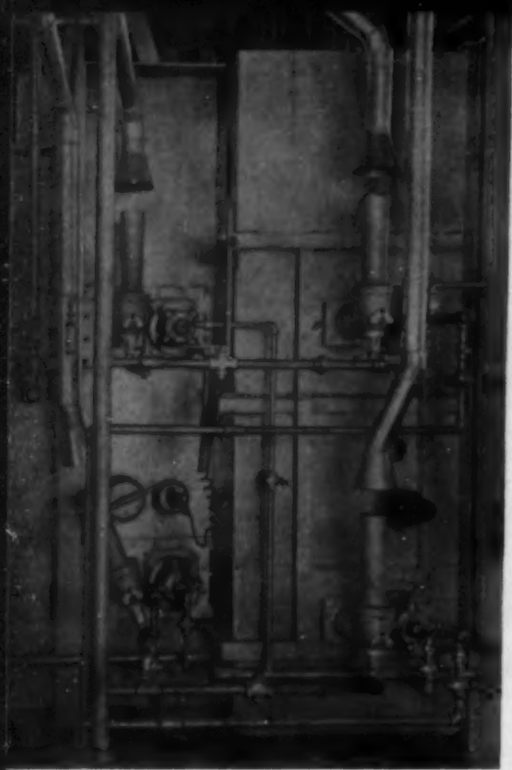


Fig. 1—Radiant tubes in furnace shown in Fig. 2 are arranged to operate under suction so any tube failures only draw gases from furnace rather than forcing gas into work chamber. Note in each of the four burners here that an eductor is inserted in the discharge leg of each burner. Idea is to draw gas-air mixture through burner and radiant tube in parallel lines of flow, producing uniform or diffused combustion throughout

Developments in . . . .

CONTINUOUS GAS CARBURIZING

By R. J. COWAN
Surface Combustion
Toledo, O.

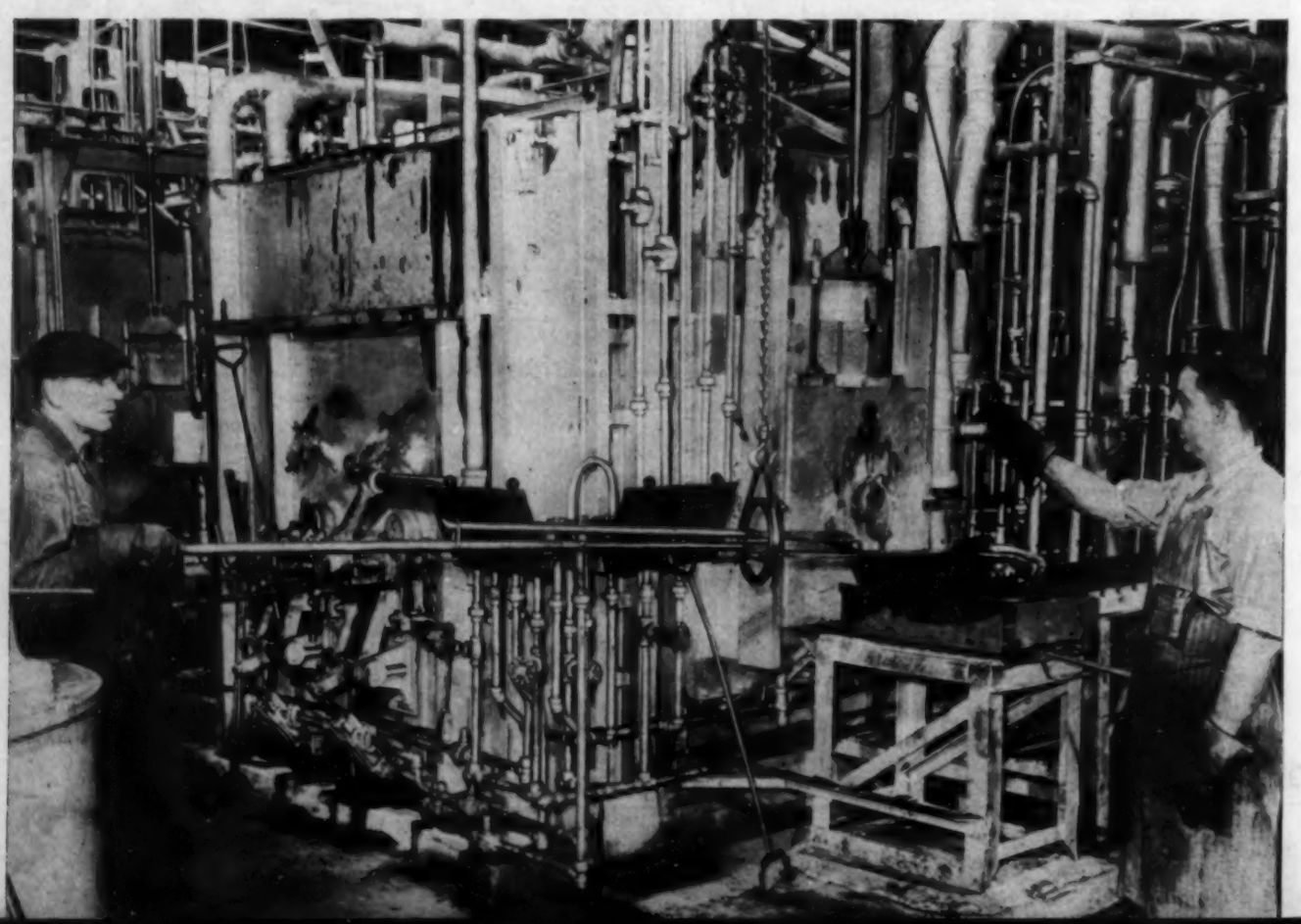
IT IS A LONG road from the first continuous gas carburizing furnace to the present multiple-row radiant-tube furnace that is being used today. The first continuous gas carburizer was installed in the plant of the Chrysler Motor Car Co., New Castle, Ind., the latter part of 1931. Compared with the present type installation, this was a very simple furnace, although at the time it was built it embraced features of design that were unusual and opened up a field of activity which has greatly simplified the carburizing process and made possible the handling of a great variety of complicated shapes with a degree of uniformity in results unapproached by any other method.

The continuous gas carburizer of today retains the carburizing simplicity of the early installation in that the steel is moved progressively through a chamber filled with gas so that during the course of its travel each successive piece receives an identical treatment in a carburizing gas of uniform composition. The operation consists simply of charging the clean work into one end of the furnace and removing the clean carburized piece from the other end at the conclusion of its carburizing treatment.

Because of the simplicity and uniformity of this operation, it has frequently been combined with other operations in a continuous cycle so that the pieces in process are carburized, quenched in oil, washed to remove the oil, and reheated for drawing or tempering in a continuous series of operations. Equipment is fully automatic and arranged so that the trays and fixtures which support

(*Please turn to Page* 118)

Fig. 2—Discharge end of a Surface Combustion radiant tube furnace for gas carburizing ring gears. Note how work is handled from furnace to quenching press using tongs suspended from overhead hoist and using roller conveyors



By GEO. F. BEARD

TIN-CONSERVING SOLDERS

An account of some Canadian investigations

VARIOUS solder manufacturers have been called upon to develop alloys free from tin or having low-tin content, which can be used to replace former lead-tin alloys for soft soldering or tinning applications.

The tin-lead alloys are outstanding in the scope of their usefulness. They may be used for joining the majority of common metals ranging from the high-melting copper alloys down to the low-melting tin alloys. Also, the tin-lead alloys can be handled by quite simple techniques; they do not oxidize rapidly when molten, and they withstand corrosion extremely well.

It is too much to expect, therefore, that any one alloy will be found that will be suitable for all applications to which the tin-lead solders were normally put. The first alternate alloy which was investigated to replace tin-lead solder was silver-lead. The most suitable of this series is the eutectic composition 97.5 per cent lead, 2.5 per cent silver at 304 degrees Cent. In comparison to the widely used 50 tin 50 lead solder which has a solidus at 177 degrees Cent. and a liquidus 211 degrees Cent., it may be observed there is a tremendous temperature difference. This may not be a detriment, depending on the particular job under consideration. However, the fact that the silver-lead alloy has such a relatively high melting temperature limits the number of applications for which it is suitable.

It was seen very early in investigations that the standard fluxing agents as used by the soldering trade were not suitable for utilization with the silver-lead solders. Again it was the high temperature required that caused this difficulty. The flux would either vaporize or carbonize before the solder had reached its flow point, thereby losing all the benefits which are generally expected of a fluxing medium.

It has long been a recognized fact in the solder business that tin is an excellent wetting agent for other metals. It is obvious that solder cannot join two pieces of metal unless it wets those pieces. Pretinning for soldering, and especially for joining bearing backs and lining metals, has long been considered as good technique. It has also been realized that with a solder, the lower the tin content becomes, the more important becomes the pretinning and the fluxing. A solder low in tin makes it essential that the surfaces to be soldered must be more carefully prepared. This may also be stated in another way; that is, the more perfectly the surfaces to be soldered are prepared, the lower the tin content of the solder may become.

Before zero tin may be reached in a solder, considerations of flow and wetting power may be replaced by questions of tensile strength, elongation, impact strength, hardness and other properties. In the majority of cases, however, these mechanical properties are of minor importance, whereas flow and wetting power are of universal importance to every soldering operation.

In every soldering operation there are four main considerations—kind of metals to be soldered, how the soldering is accomplished, the composition of the solder, the flux composition.

Then once the joint has been made, it may be called upon to exhibit certain properties such as tensile strength, shear strength, capillary rise of solder in joint, corrosion resistance.

The strength of a soldered joint is directly dependent on the thickness of the solder employed. For maximum strengths the solder thickness should not be less than 0.003-inch nor greater than 0.005-inch. The time of heating also bears a direct relationship to the strength of a soldered joint, but this factor is less important than solder thickness. Nevertheless, it was found that increased time of heating tended to produce intermetallic compound layers in the solder which decreases the strength of the joint.

Developments in Fluxes: Reference has already been made to fluxing during soldering operations. This cannot be stressed too strongly, for the flux used on a job is as important as the solder itself for the production of a satisfactory product. The chief purposes of a flux are to protect the metal against oxidation, to remove dirt and oxides from the metal, to increase the wetability of the metal by the solder and thereby increase the flowing characteristics of the solder, to make a stronger and better soldering job.

As already stated, the old types of fluxes were quite ineffective with the silver-lead solders. This was due to the high flow temperature of the silver-lead alloy.

This particular problem has been very satisfactorily solved. Table I showing the actual results of tests using both the old type and the new type of fluxes will verify that satisfactory fluxes have been developed for use with the silver-lead alloys. The test used in this investigation was known as "the spread of the drop test". This is carried out by placing a known weight of solder on a flat iron sheet, suitably fluxing the sheet and applying heat to the underneath side. When the iron sheet has become hot,

(*Please turn to Page* 128)

From *Canadian Metals & Metallurgical Industries.*

TABLE I—Results of Tests Using Old and New Type Fluxes

Solder Composition	Old Type Flux		New Type Flux	
	Area in.²	Per Cent. of 50/50 Area	Area in.²	Per cent. of 50/50 Area
50/50 Tin-Lead	4.0	100	4.0	100
40/60 Tin-Lead	4.5	113	4.55	113
5/95 Tin-Lead	3.1	78	3.2	80
1/99 Silver-Lead	0.54	14	8.5	213
2/98 Silver-Lead	0.37	9	4.9	105
2.5/.25/97.25 Silver-Copper-Lead	2.6	65	5.2	130
4/96 Silver-Lead	0.37	9	4.9	123

TABLE II—Tests on Alternate Solders

	50/50 Tin-Lead lb./in.²	Cadmium-Lead lb./in.²	Silver-Lead lb./in.²	Tin-Silver-Lead lb./in.²
Shear Strength				
(Steel)	7,658	7,777	4,360	6,375
(Brass)	7,529	8,039	4,490	6,300
Tensile Strength				
(Steel)	9,480	12,160	5,610	7,540
(Brass)	14,852	16,766	8,850	11,974
Spread—Unit Volume	100 per cent.	85 per cent.	60 per cent.	80 per cent.
Specific Gravity	8.91	10.81	11.29	10.16
Corrosion 3 per cent. Na Cl per cent Loss Weight				
100 Days	0.292	0.134	0.893	0.194
Liquidus °F.	414	470	580	520
Solidus °F.	359	460	576	485
ALLOYS:	lb./in.²	lb./in.²	lb./in.²	lb./in.²
Tensile Strength	8,160	8,720	4,850	6,750
Elongation	16 per cent.	15 per cent.	12 per cent.	16 per cent.
Brinell Hardness	12.7	13.1	9.7	13.

MICROSCOPIC PRECISION TOOLS

.... indispensable in war, may lead to entirely new industrial techniques and products

DEVELOPMENT of methods for microscopic, precision machining of metals and other materials may lead to entirely new industrial techniques and new products.

Imagine the possibilities which exist for drills which will make perfectly round holes down to 0.003-inch in diameter in any material with the exception of the tungsten carbides and diamonds! And, holes may be lapped in the latter two materials.

Already, microscopic drills, now being made for diesel engine builders, are proving of incalculable aid in the war effort. By actual block tests, it has been found that practically infinitesimal variations in the sizes of holes in diesel engine fuel nozzles will result in a difference of several hundred horsepower in power output of large marine engines as well as a marked difference in fuel economy. Use of several small holes in place of a single larger hole provides the advantage of completely atomizing the fuel.

Back of these developments is the work of J. A. Cupler II, a young chap in his early thirties, who already has es-

Top to bottom, left—

Fig. 1—Bearing sleeves 0.025-inch long and 0.035-inch in diameter are machined to exacting limits with one setup on this converted jeweler's lathe

Fig. 2—"Rough" cutting the blade for 0.0065-inch drill. Overall drill length is 5/8-inch, blade length 0.04-inch

Fig. 3—This heat-treating setup flame hardens microscopic drills with minimum distortion. It comprises a gasoline torch converted to burn gas and air and an oil quench "tank"

By IRWIN H. SUCH
Eastern Editor, STEEL

tablished a name for himself in Army, Navy and industrial circles. He started his business career with the Celanese Corp. of America in Cumberland, Md., where he became cognizant of the increasing necessity for microscopic tools since the rayon industry itself is engineered around the small holes in rayon fiber spinerets.

Mr. Cupler observed that American-made twist drills could be had in sizes only as small as 0.013-inch and did not hold up too well. Further, due to the war, it was becoming increasingly difficult to obtain Swiss drills which could be had in sizes down to 0.006-inch. Consequently, he decided to go into the microscopic tool business for himself, first working nights in his bedroom and later setting up a full-fledged operation in the family garage with the aid of two or three assistants. One year ago, he moved into the two-story building in Cumberland now occupied by his company, the National Jet Co.

Foresees Wide Diesel Use

In looking ahead, Mr. Cupler is willing to predict that most trucks on the road within a year after the war is over will have diesel engines; further, that within seven years, diesel engines will be well accepted as the standard motive power for passenger cars.

Another development already under way is a new hypodermic syringe without a needle which can be used by any inexperienced individual. The injection is forced into the flesh through a minute hole in a disk at the end of a syringe by a charge in the barrel which is released by a small trigger.

By way of pointing out the further possibilities for the small hole, Mr. Cupler has designed a nozzle for an ordinary commercial oil burner with only two small parts, including a strainer, the oil being injected through five 0.006-inch holes. It functions as well as a conventional nozzle now used, which has five parts.

As an example of microscopic machine work now being done, the National Jet Co. is making bearing sleeves which are only 0.025-inch in length and have an outside diameter of only 0.035-inch. Several hundred of these are shown in the small capsule in Fig. 4.

The machining operations are performed on the small lathe in Fig. 1. Both ends are chamfered and one end countersunk to 0.005-inch. The inside diameter must be concentric with the outside diameter. Wall thickness is 0.019-inch. Inside diameter is checked with 0.0153 and 0.0154-inch go and no-go gages. Finish, of course, must be perfectly smooth.

Manufacture of these sleeves is just part of the work now being done on precision instruments for war machines. Fuse parts with holes ranging from 0.02 down to 0.008 and 0.007-inch are regular production items, along with control instruments for aircraft and special applications.

The methods employed by the National Jet Co. in making exceedingly small tools, such as drills, punches, reamers and end mills, have few parallels in American industry, as may be visualized when it is pointed out that many now being turned out are smaller than a human hair!

Production of drills well illustrates the procedures followed but, first it must be explained that these drills are of the pivot type which antedate the twist drill and are sometimes referred to as flat or fishtail drills. And, the small 0.0059-inch drill, second from right in Fig. 4, has the same general shape and is machined just as accurately as the "large" 0.182-inch drill shown at top of this illustration.

Bulk of the National Jet Co.'s production is in standard drills in sizes ranging from 0.003 to 0.020-inch, all machined from a tungsten-molybdenum-vanadium alloy drill rod 0.04-inch in diameter purchased in 3-foot lengths and cut into ⅝-inch blanks. In other words, all drills in the range noted are standard as to shank diameter and overall length. Length of the cutting blade in each case is held to seven times the diameter of the shank. The company also produces drills in tungsten and tantalum carbides for use in penetrating refractory and other extremely hard materials.

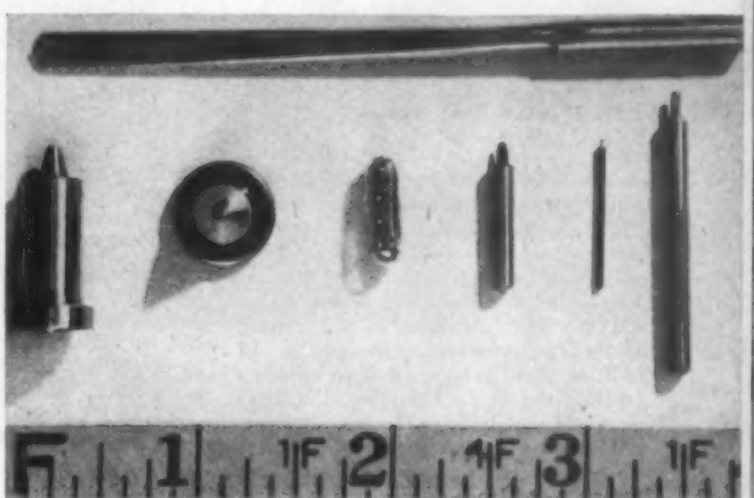


Fig. 4—Small 0.0059-inch drill second from the right has same general shape and is machined to same accuracy as the "large" 0.182-inch drill at top of illustration. Also shown, left to right, are two diesel engine jets; bearing sleeves in the small capsule; a reamer and, at extreme right, a counterbore radius tool

These minute drills are machined to meet the individual requirements encountered in drilling various types of material. Cutting edges of drills for steel have less rake than those for working with brass, as may be expected. In addition, the undercut at the shank end of the cutting blade is less. Usually, drills for steel and general purposes have a point angle of 135 degrees, and 118 degrees for soft materials. Clearance angles are respectively 8 and 15 degrees. Tolerances in all cases are held within the unbelievable limit of 0.0001-inch.

It also is interesting to note that 20-power binocular microscopes are incorporated as part of each machine because of the microscopic character of the work. Machines are all improvisations, many being revamped jewelers' lathes. No source has been found so far, either, for standard machines or heat-treating equipment required.

Production of 0.0065-inch drills will be described as this is a typical size for piercing diesel engine jets. The drill blanks, as previously noted, are ⅝-inch long and 0.040-inch in diameter. The cutting blade, first, is rough cut to 0.0067 to 0.007-inch. This operation, shown in Fig. 2, appears simple enough to the casual observer. Blanks are picked up individually with a pair of tweezers, placed in the tiny lathe chuck, turned down to size and placed side-by-side in a small tray in which they are conveyed to the heat-treating department. Actually, the operation requires skilled operators with a delicate sense of touch and an accurate eye for gaging measurements under the 20-power glasses.

Following the rough cut, the drills are flamed hardened by a method which, according to Mr. Cupler, violates all principles involved in heat-treating small parts. The heating unit is a gasoline blow torch converted to burn natural gas and compressed air. The flame is directed against a small trough at an angle from below so drills dropped in the trough one-by-one are heated without contact with the flame. When the drills reach 1875 degrees Fahr. as determined visually by a trained operator, they are pushed off into an oil bath, as will be observed in Fig. 3. There is practically no distortion of the tiny blades.

The drills then go to the drill makers who "polish" the cutting blades to exact size, using superfinishing stones mounted on flexible shafts. During this operation, the drills are held in the vertical head machine shown in Fig. 6. The flats, cutting edges and the undercut at the base of the shank for chip clearance are all finished to exact size under the expert eyes of trained op-

Fig. 5—Drill dimensions are checked against a scale on the eyepieces of the 200-power microscope. Rejections, even under 0.0001-inch tolerances, are unbelievably small

erators. Drill diameters are checked with a micrometer and other dimensions later are checked by inspectors.

Since the work must be fully visible during the machining operation, it is impossible to use a coolant which means that the hardness rating of the cutting blades is reduced one to five points. In addition, small burrs are thrown up when grinding the flats. Therefore, the drills are again sent back to the heating-treatment department to restore hardness to an average of 62 to 63 rockwell. The cutting edges then are re-honed to remove the burrs and the drills are ready for inspection.

Inspectors use 200-power microscopes. Eyepieces are filled with accurately graduated scales which are superimposed upon the magnified image of the drill, thus allowing "comparator" measurement. Each division on the scale is calibrated to 0.0002-inch. Drills are first checked for diameter at the cutting tip; next for diameter midway between the base of the shank and the cutting tip; and finally at the base of the shank. In the case of an 0.0065-inch drill, the measurement at the base is held to a minimum differential of 0.0005-inch. In other words, the base cannot measure less than 0.006-inch. Length of the blade then is measured to determine whether it conforms to customer specifications. The average blade length for this drill is 0.04-inch.

After the length is measured, the drill is turned so that the thickness may be checked between the flats at the tip, midway between the base and the tip and at the base. The 0.0065-inch drill should measure 0.0022 to 0.0024-inch at the tip, 0.0035 to 0.0040-inch at midpoint and 0.0059 to 0.0065-inch at the base.

"Knack" Required To Use Drills

The distance from the extreme point of the drill to the base of the cutting point is checked against lines of predetermined length on the microscope eyepiece. Even the rake angle can be visually checked by turning the drill so that this rake angle lines up with lines on the scale which may be set at a fixed angle. During the checking operation, the drills are held in a small fixture at a predetermined distance from the end of the microscope, as will be noted by referring to Fig. 5.

No article about these small drills would be complete without explaining something about their functioning in service for, in the hands of an inexperienced operator without the proper equipment, they would be quite useless.

The secret of working with these small tools lies in properly controlling the drilling pressure. In fact, exact control of drilling pressure has as much to do with attaining accurate hole size as does the diameter of the drill itself.

Application of too much pressure causes the drill to "lead off" because the cutting blade springs. It, also, causes "bell-mouthing" at the entrance to the hole, generates unnecessary heat and produces undue torque, all of which add up to reduced drill life as well as lack of accuracy in finding work.

Another important point to be emphasized is that the drill must run absolutely true in its drill press chuck. Even slight wobble is likely to cause the drill to break at the base of the shank and in any event makes it impossible to drill a hole accurately to size.

A typical operation, that of drilling holes in diesel engine fuel injectors, is shown in Fig. 7. It will be noted that a counterbalancing arrangement on this little sensitive drill press makes it possible to feed the drill to the work with a very light touch and with a reciprocating motion. The drill cannot be fed steadily as in the case of large sizes. Only enough pressure is applied on each stroke to make the point bite into the metal, generally less than one ounce per square inch. Obviously, the pressure and timing of the strokes can vary depending upon the type of material in process.

Minute Drill Press

Mr. Cupler has designed a fully automatic drill press which incorporates a micrometer control. This device, in connection with a series of worms, sprockets, cams, etc., provides automatic reciprocation of the drill spindle. The resulting automatic "step-feed" provides a stroke of one three-thousandths of 0.001-inch per stroke. This stroke may be varied according to the material being penetrated and depth of hole.

Mention already has been made that any material may be drilled with the exception of carbides and diamonds. For the purpose of complete clarification, it should be pointed out that certain other drilling operations are not practicable, such as on tool steels after hardening.

For plastics, it probably would be more advantageous to use tantalum carbide drills because of the abrasive character of plastics, although alloy steel drills with a heavy rake may be used.

The palladium-platinum alloys also are

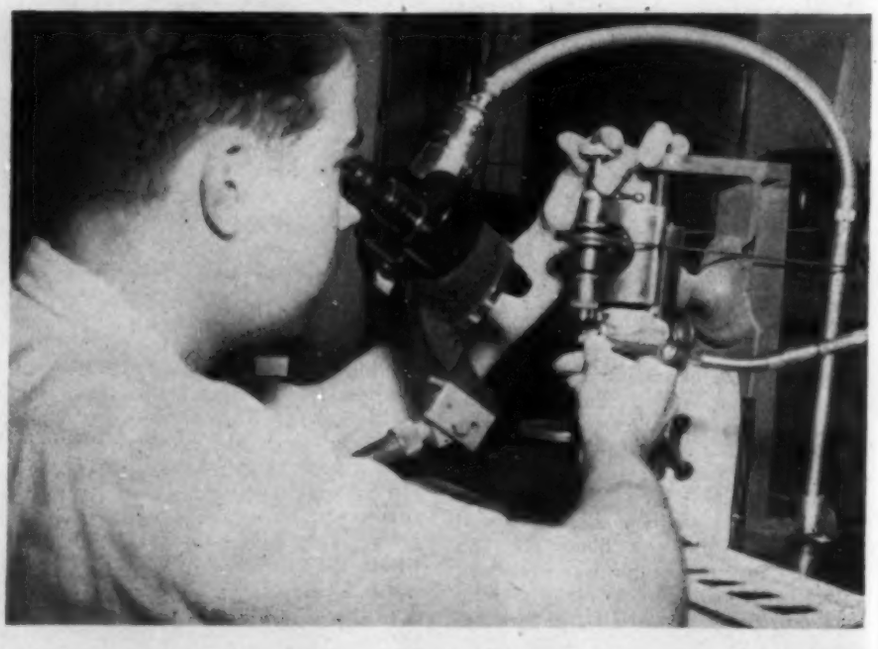


Fig. 6—Drill flats and cutting edges are ground within limits of 0.0001-inch with superfinishing stones hand-guided by expert operators

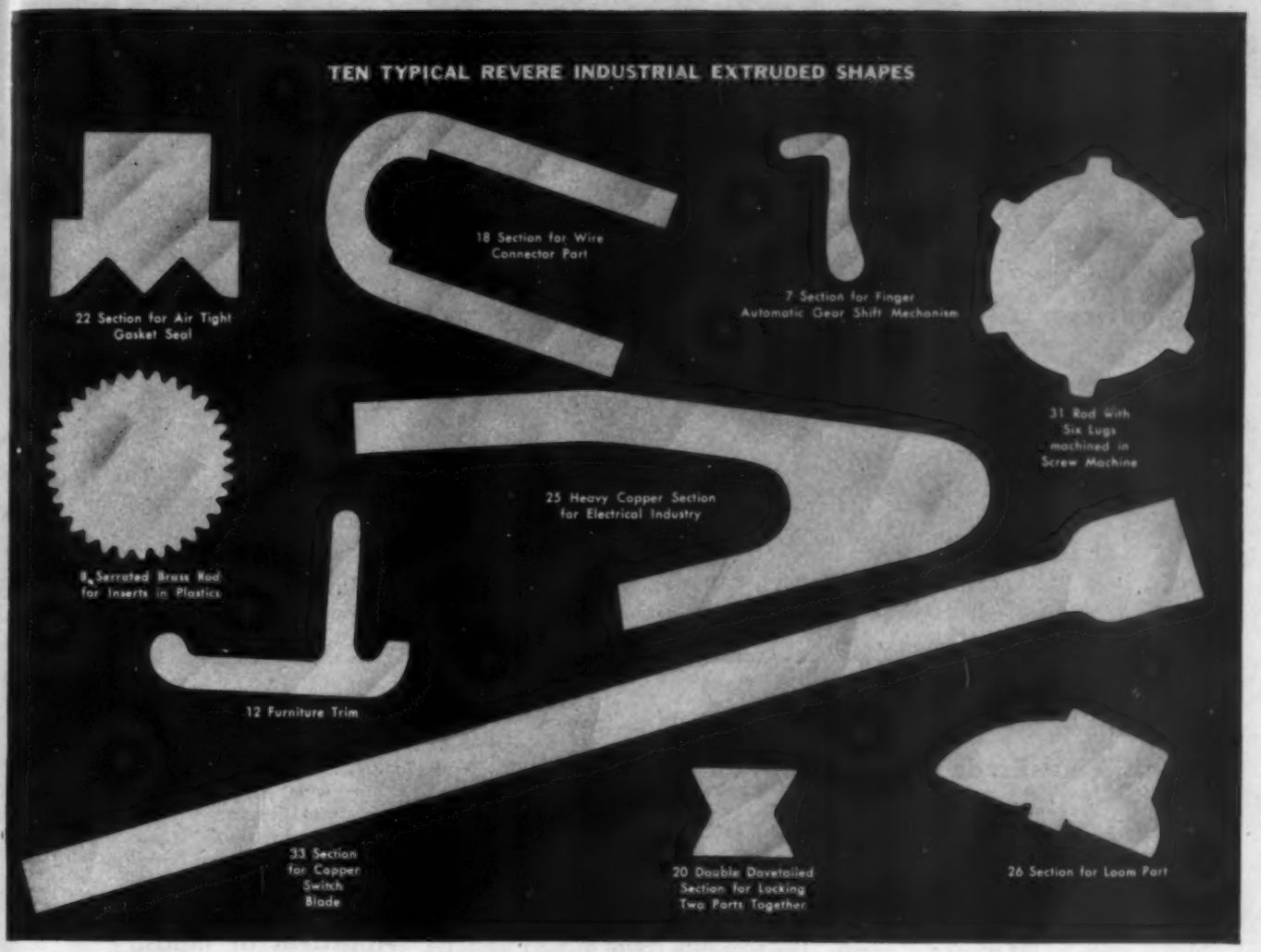

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Fig. 7—Drilling holes in diesel engine jets requires precision equipment and the deft touch of a skilled operator

treacherous to machine since these metals are so dense that the drills absorb all the heat.

Hard spots in certain types of tool steel nozzles constitute a problem. Blanks generally are turned out on automatic screw machines. This operation, along with drilling the center hole, work-hardens the material unevenly. Now, the practice is either to anneal these pieces after machining or to employ tantalum or tungsten carbide drills which will cope with the hard spots.

So far, the field of microscopic, precision machining has been barely touched, in the opinion of Mr. Cupler. A number of developments already have passed beyond the development stage, one of which, incidentally, is associated with television. Others are expected to make their appearance when the country returns to peacetime activities.

Spaghetti in the War! Speeds Vital Production

Uncooked spaghetti is now being used to speed the manufacture of electronic tubes used for war communications!

Seventy-five per cent of the time required to assemble certain tube filaments at the Westinghouse Lamp Division now is being saved by the novel war substitute discovered by William A. Hayes, a young electronics engineer. Not only time, but also steel is being conserved by the discovery.

A stick of spaghetti placed inside a tiny wire coil supports the coil while it is being welded, states D. D. Knowles, manager of electronics engineering. Formerly a piece of steel was used as a support but it was difficult to remove. On the other hand, spaghetti can be burned out in a flash. The method is instrumental in producing 50 per cent more filaments and, at the same time, allows assembly operators to spend part of their time on other production jobs.

To explain the procedure involved—wire filaments for many tubes are coiled in shape of a small spring, ¾-inch long. When each coil was being welded to the rest of the tube mechanism, a steel piece about as thick as a 7-penny nail was inserted inside the spring coil to support it and keep it in accurate alignment. The steel piece had to be split wi'h a saw before inserting it in the coil. Without the split, the piece was difficult to remove after the welding operation because of tendency of the coil to tighten around it. Sometimes removing the steel piece jarred the coil and it had to be realigned.

In trying to break the bottleneck, Mr. Hayes tried spaghetti. After the filament is welded, electric current is passed through the coil to remove any impurities in the metal. This also burns up the spaghetti in a flash—the same flash eliminating the removal problem. Formerly the operation required about 5 minutes. By using spaghetti, the job now is handled in a quarter of that time.

According to Mr. Hayes, his idea didn't take final shape all at once. He visited the spaghetti manufacturer and found out how accurately it could be produced with regard to exact size. He found that spaghetti can be made with fair precision and is strong enough not to break if handled carefully; it even can be machined on a lathe. For the first experiments, a stick of spaghetti was placed on a lathe and was machined to the correct diameter. The spaghetti maker now uses a die to enable him to produce sticks the correct diameter for the tube operation.

Dravo Develops Connectors For Nonmetallic Ductwork

A method for assembling nonmetallic ducts for heating and ventilating to conform with restrictions now in force on metal for such purposes, and to meet requirement for noncorrosive ductwork is reported by Dravo Corp., Pittsburgh.

The method, or the Lumm panel connector, as the development is called, basically consists of three members which can be formed of gages of metal depending on the perimeter of the duct required. Of the three members, one makes up the lineal corners of the ducts, one forms a flange frame for one end and the other is used to form a frame for the opposite end. Panels are secured by clips placed on 12-inch centers. Clips are shaped to permit the nonmetallic panels to be fitted snugly between them and the basic member.

According to Dravo, this form of assembly forms a frame of unusual rigidity, reducing pulsation and offering a strong structural anchor for hanging ducts by straps from roof construction. In the interior of the duct, the flattened clips are the only metal exposed. Replacement of panels can be made without removing a complete section.

Approval of Industry Sought on Furnace Standard

A proposed commercial standard for solid-fuel-burning forced-air furnaces, TS-3536a, is being circulated to the industry for acceptance, according to the National Bureau of Standards, United States Department of Commerce, Washington.

Proposed standard is being circulated to producers, testing laboratories, distributors, and users of solid-fuel-burning furnaces in order that it may become more widely effective through establishment as a commercial standard.

Turns Out Huge Right-Angle Reduction Drive

In filling a production order recently, Cone-Drive Division, Michigan Tool Co., Detroit, turned out a 97½-inch outside diameter drive, believed to be the highest capacity right-angle reduction drive gear ever produced. Its capacity, it is said, is equivalent to a 161-inch outside diameter worm gear.

The gear and pinion were produced on standard generating machines, a feature being that backlash was held in production to a maximum of 0.003 to 0.005-inch. Reduction ratio of the gearset is 192 to 1, while the pinion diameter is 7 inches.

Stepping Up... and Keeping Up the STEEL CUTTING PRODUCTION of the United Nations

WITH the outbreak of war in 1939, the Allied Nations—abruptly cut off from Germany as a principal source of supply for carbides—diverted the full flood of their carbide demands to the United States.

Fortunately, American industry had established—as far back as 1928—its own independent sources of supply. These American suppliers were ready to meet the emergency with a background of 10 years' experience in the development, manufacture and application of this urgently needed material. They had the skill, the equipment, and a generous margin of reserve capacity.

To the hard pressed Allied Nations—struggling to offset the tremendous output of a German war production long since tooled with carbide *by official decree*—went tons of American carbides in steadily increasing quantities. Foresight and preparedness enabled American carbide manufacturers to fill this urgent need and at the same time meet the pyramiding demands of domestic industries.

Today, you will find carbides a factor of vital importance in stepping up and keeping up the production of not only the United States but also such countries as England, Russia, Australia, Canada, China, India, Mexico and many others among the United Nations.

The full extent to which carbides are being used in the cause of victory is difficult to visualize. Carboloy Company production alone, for example, is at an annual rate 45 times greater than that of any pre-war year. Monthly production of carbides—formerly measured in pounds—can today be expressed in tons—many tons per month! Yet the average carbide tool contains but a fraction of an ounce of carbide at the cutting edge—and a single tool during its usable life machines hundreds of parts for the implements of war. Particularly important is the use of carbides for cutting steel—a major field of use for Carboloy tools. (More than 60% of the Carboloy Cemented Carbide produced today for machining purposes is for cutting steel.)

A high order of performance—so high as to have been once considered incredible—is now commonly expected, and obtained, with carbides. Such things as increases in output of 3 to 1, lengthened tool life of 10 to 1, finish cuts that eliminate arduous grinding, machining of former "non-machineable" alloys, reductions of 25%, 50%, 75% in machining costs—results such as these are every-day occurrences in war production today.

This widespread use of carbides in war, indicates a new era of production economy when normal commerce returns. Manufacturers who have converted to carbides to meet the present emergency will then have at their immediate disposal an economic weapon of unusual advantage in seeking world markets.

Carboloy Company, Inc., Detroit, Mich.

Authorized Distributors: Canadian General Electric Co., Ltd., Toronto.
Foreign Sales: International General Electric Co., Schenectady, N. Y.

CARBOLOY
TRADEMARK

TITANIUM — TANTALUM — TUNGSTEN CARBIDES

AIRCRAFT DIES

. . . . made in one-fourth the time and at only 35 per cent of cost of conventional methods

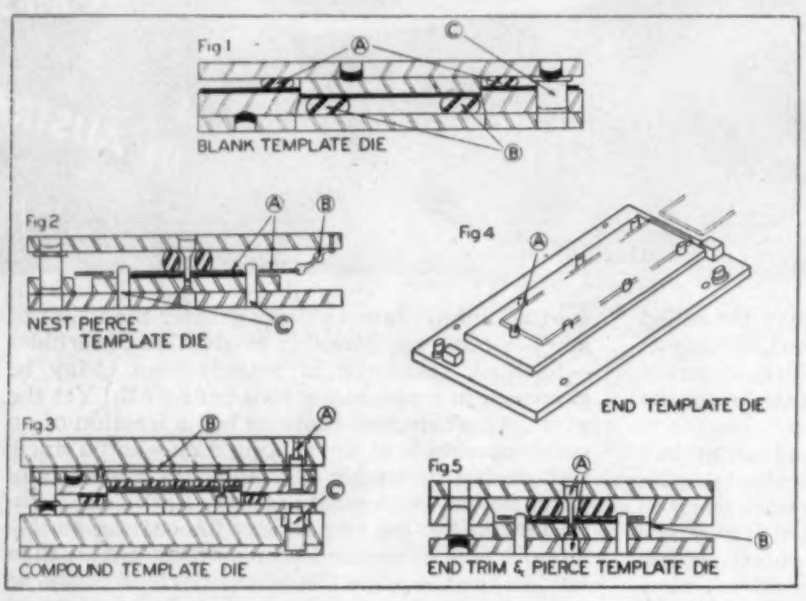
BY PRODUCING blank and pierce dies for the aircraft and other industries from templates of the parts themselves, Algoma Products, Detroit, reduces the cost approximately 65 per cent and does the job 300 per cent faster. This method eliminates the need for special die design and also simplifies making alterations when they are needed.

Instead of the usual complex, time-consuming and costly milling operations, the dies are contour-sawed from chromium molybdenum steel, filed, sheared to size, hardened and welded to inexpensive back-up plates. One-third of the critical alloy steel required in conventional dies is thus conserved. Individually replaceable pierce punches of hard-drawn tool steel are pressed into the blank die and matching holes drilled in the blank punch for piercing holes in the part.

The dies are self-stripping and self-ejecting. Small rubber blocks cemented to the back-up plates near the edges of the punches and in the blanking die are compressed on the down stroke, and in returning to shape on the up stroke, strip the punches and eject the part from the die. See accompanying illustrations. Where a large number of pierce punches are required, a thin aluminum alloy plate is cemented over the rubber blocks to equalize the stripping pressure.

All punches and dies are heat treated to withstand continuous production service. Blank punches are cyanide hardened, blank dies flame hardened at the cutting edges, and pierce punches hardened and drawn to 40-42 rockwell C.

Punch and die are kept in alignment by two guide pins of different diameters in one portion of the die and matching holes in the mating part. The different diameters prevent incorrect assembly of the dies in the press. Such dies are suitable for use in single, compound or progressive operations, and are adaptable to blanking and piercing sheet stock or stock sheared to width of the part. In the latter case, individually removable nest pins are inserted in the face of the die to locate the work.



Typical dies being produced by Algoma process. Note: Rubber blocks for stripping at Fig. 1A, for ejection of work from die, Fig. 1B; alignment guide pins of different diameters to prevent incorrect assembly, Fig. 1C; thin aluminum plate to equalize stripping pressure, Fig. 2A; chain supports, Fig. 2B; inserted work-locating nest pins, Fig. 2C; die-to-shoe mounting capscrews, Fig. 3A; spring supported dowel pins to push off slugs, Fig. 3C; separate back-up plate for punches in large size dies, Fig. 3B; stop pins for one-end cut-off, Fig. 4A; inserting punches, Fig. 5A, produces end-trim-and-pierce die; die can be made to trim both sides also, Fig. 5B

Milling of Compressor Beds Cut by 60 Per Cent

One of the factors responsible for boosting the output of compressors furnished for the production of high-octane gasoline, synthetic rubber, synthetic ammonia and other essential war materials at the plant of Copper-Bessemer Corp., Mount Vernon, O., is a huge 131-ton milling and boring machine. Driven by nine separate motors, the machine is said to cut milling and boring time of compressor beds by 60 per cent.

The machine is being used currently to mill and bore large motor-driven compressor beds, and also to machine the big bed castings for 10-cylinder compressor engines. A 40 per cent saving in time has been effected on each compressor bed, and over 62 per cent saving in time in machining each compressor engine according to corporation officials.

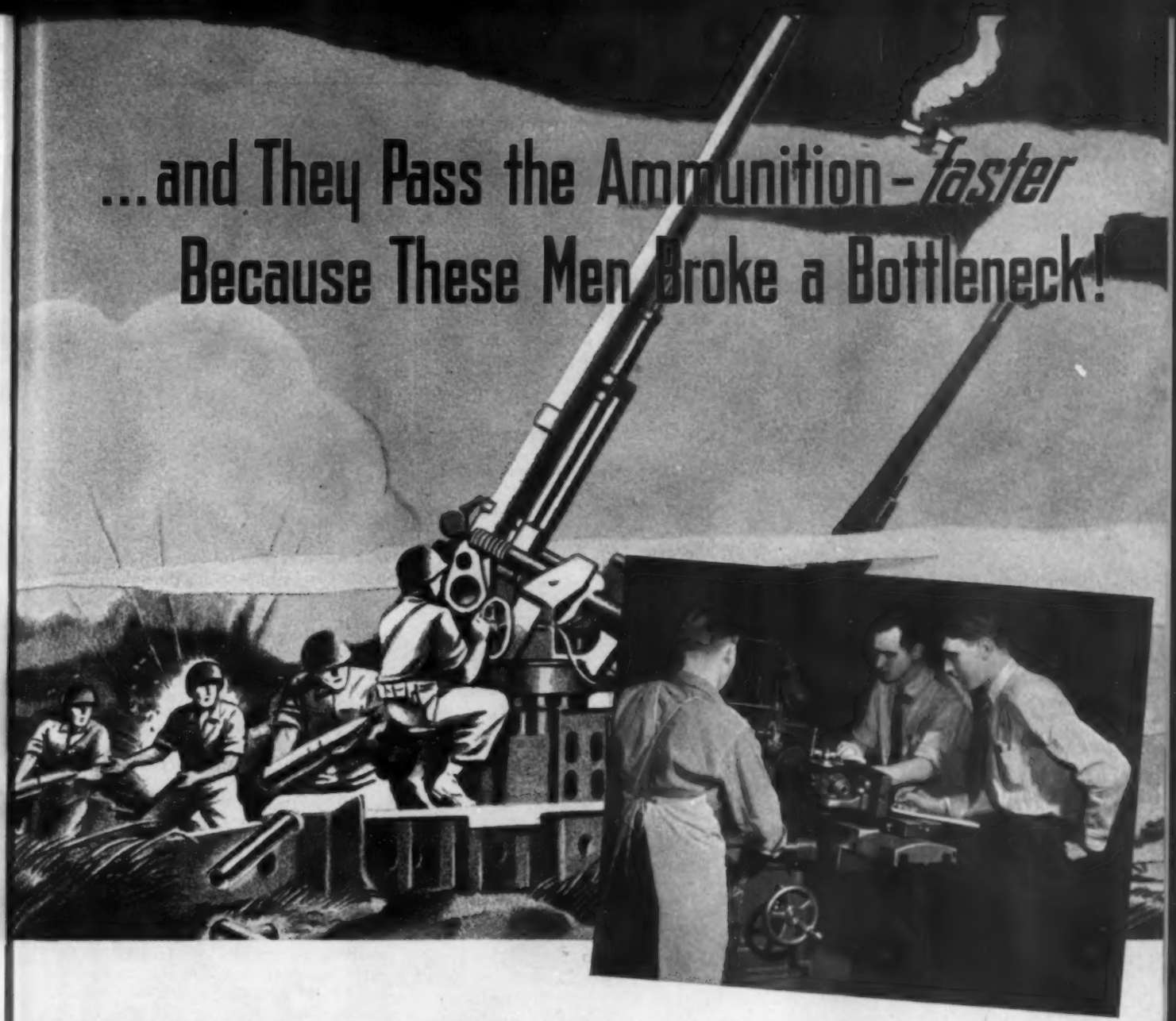
Flexibility of the machine's speed permits a wide range of operations—from drilling a ¾-inch hole at a speed up to 240 revolutions per minute to boring a 30-inch cylinder at 2 revolutions per minute. Handling of the precision work is facilitated by means of a compact, portable control panel containing 13 switch buttons governing every movement of the machine. With this arrangement, the operator can stand at any point along the work-piece to observe and control the actual operations as they take place. In milling a 32-ton compressor bed, for instance, he can move this weight to within 0.001-inch of a required setting by merely pressing a button.

Precision of the machine is exemplified in the allowable variation of the bed of the unit which is only 0.003-inch in the entire 26-foot length of its horizontal surface. The sensitivity of the machine was indicated when shop engineers found that one of the two vertical columns supporting the bed was nearer to an open door than the other, and therefore subject to a different temperature, thus causing a variation in the accuracy of the machine. This condition was corrected when both columns of the machine were maintained at the same air temperature.

An idea of the machine's size is afforded by the fact that 350 cubic yards of concrete were necessary to form the foundation. Its nine separate motors range from 1/3 to 20 horsepower. The machine table measures 98 inches wide by 26 feet long.

It was pointed out by the company that the addition of this equipment not only speeds its own war work, but aids other plants in emergencies.

...and They Pass the Ammunition—*faster*
Because These Men Broke a Bottleneck!



When a War Job "Can't be Done"—the Cutting Tool Industry Does it!

You never hear much about the work it's doing. But without America's highly specialized cutting tool industry, America would be *without* a big edge over an alleged "super" race.

For here's a significant fact: cutting tools give life to machine tools . . . machine tools that build Axis-blasting guns, shells, tanks, planes.

Yes, and total war brought totally new and serious problems to the cutting tool industry. Production demands skyrocketed to new peaks — and so did shortages of two critical elements: manpower and materials.

Such tremendously expanding operations naturally gave rise to engineering problems of grave complexity. Overcoming such obstacles required the mustering and all-out concentration of the initiative, experience and brainpower of the cutting tool industry's best minds.

A revealing example of that cooperation is pictured above. Here . . . Barber-Colman cutting tool experts are shown developing a special cutter. In a similar manner, UNGROUND thread milling cutters were developed *—within tolerances of only 5/10,000ths of an inch*—for threading high-powered shells.

That was the Army and Navy specification that *had* to be met. Performance like that was formerly attainable only through time-consuming and laborious grinding operations. A bottleneck, yes, but Barber-Colman engineers found a way to break it. Production of Axis-smashing ammunition was enormously stepped up.

From now until victory, of course, Barber-Colman facilities are aimed at only one objective: helping to win that victory. When the war is won, look to Barber-Colman engineering to make short work of peacetime production problems, too!

Barber-Colman Company

GENERAL OFFICES AND PLANT • 204 LOOMIS STREET • ROCKFORD, ILLINOIS, U. S. A.

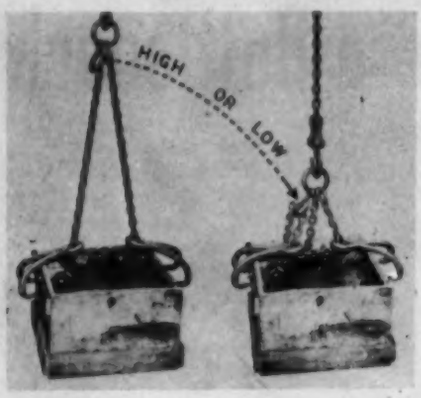
Complete Cutting Tool Service • Engineering • Manufacturing

Hobs • Milling Cutters • Reamers • Special Tools • Sharpening Machines

INDUSTRIAL EQUIPMENT

Grab for Varied Loads

Heavy crates, boxes, bundles or other heavy objects are easily handled by means of a new grab announced by

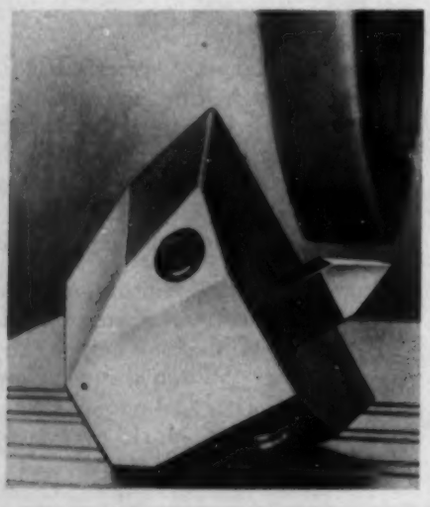


Palmer-Shile Co., 796 South Harrington street, Detroit. Loads of almost any shape can be manipulated by the unit.

The grab is adjustable to either high or low ceilings. Its hooks are of heavy forged steel and have a spread of 16 to 48 inches. These are supported by ⅝-inch chains. Weight of the grab is approximately 30 pounds.

Grinding Fixture

Grinding of both 60 and 29-degree threading tool bits with extreme precision is the feature of a new grinding fixture recently announced by Robert H. Clark, 3424 Sunset boulevard, Los Angeles. The fixture has no graduated scales or moving parts. The machinist merely slides the bit into the holder, tightens a setscrew and places the fix-



ture on the grinder work table, properly positioned for the thread angle desired.

Design of the fixture makes it especially adaptable for use with a magnetic chuck, although it easily can be clamped to the work table. The tool bit holders will hold securely round or square tool bits of all sizes from ⅛ to ⅝-inch for cutting both right and left-hand threads. Correct side clearance is provided, and all bits may be ground with or without rake on the cutting face.

The fixture may be used on any surface grinder or cutter grinder. It is being offered in two standard sizes, each of which takes all tool bits within ⅛ to ⅝-inch range. One model is designed for the mechanic's tool kit; the second performs exactly the same work but is a heavy duty shop model.

Foot-Operated Press

Ferracute Machine Co., Bridgeton, N. J., is offering a new model No. FO2 foot-operated press for forming, cutting, piercing, riveting, stamping and other light operations. A kick of the pendulum lever operates the ram of this ma-

chine while the weight of the lever alone returns the ram to the initial position.

The unit has a ram pressure near the bottom of the stroke of 2 tons. Stroke of ram is 0 to 1½ inches. The throat of the machine, center of ram back to frame, measures 4½ inches. The diameter of the bed is 8½ inches, and the hole through the bed is 3 inches in diameter. The press is being offered for bench mounting or as a floor model with a cast pedestal.

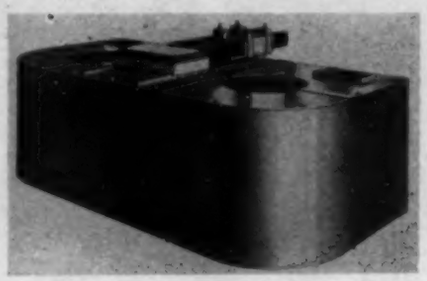
Heat-Treating Unit

Three pots feature the new type 230 high-speed heat-treating unit introduced by A. F. Holden Co., New Haven, Conn. Of these pots Nos. 1 and 3 are removable and interchangeable, permitting several different baths to be used in the same furnace unit.

Pot No. 1 features a temperature range of 1400 to 1800 degrees Fahr. It is for preheating high-speed tools, carburizing, silver soldering, heating water and oil-hardening steels as well as alloy steels such as high-carbon, high-chromium or stainless types.

Pot No. 2 with a temperature range of 1900 to 2350 degrees Fahr. is for hardening all types of high-speed steels, copper brazing and heating forgings.

No. 3 is used in quenching high-speed tools from the hardening temperatures, tempering, nitriding, blueing



and for descaling forgings and similar parts. It features a temperature range of 1000 to 1400 degrees Fahr.

Some advantages of the heat-treating unit are: No scale at any temperature; tools hardened with minimum diameter change, minimum distortion and one-third less time for subsequent finishing operations.

Induction-Heating Machine

Suited to a wide range of induction-heating applications, the new flexible 15-kilowatt Tocco Junior induction-heating machine announced recently by Ohio Crankshaft Co., 3800 Harvard avenue, Cleveland, can be adapted to brazing, annealing, heat treating, heating for forging and surface hardening of small and medium-size parts. A compact 9600-cycle high-frequency unit, the machine is capable of providing continuous opera-

tions around the clock with minimum maintenance and care.

Featured in the unit is a 20-horsepower motor-generator set that maintains accuracy of heat control at all times. Inductors for brazing carbide tips are designed to treat more than one

(*Please turn to Page* 137)

(All claims are those of the manufacturer of the equipment being described.)

SOUTH BEND LATHES

BUY WAR BONDS

ARMY E NAVY

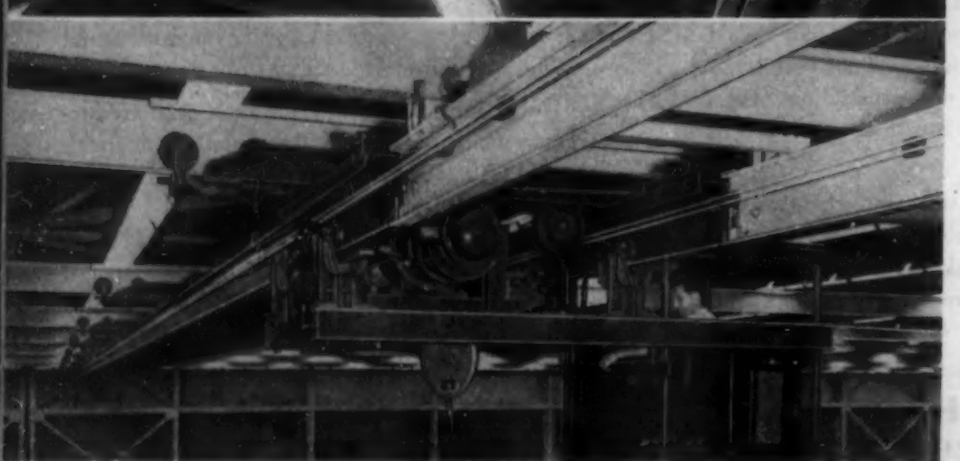
War production demands uniform accuracy. Loss of time or the waste of scarce strategic materials because of variations in machining cannot be tolerated. There is no place in our war production plan for equipment that cannot be relied upon to maintain required tolerances.

Sound design and careful workmanship give South Bend Lathes the dependable precision that assures uniform accuracy. Built by skilled craftsmen who take pride in their work, they are capable of maintaining split-thousandth tolerances on all work within their capacity. Their unvarying performance speeds production on the most exacting machine operations and assures perfect interchangeability of parts and units.

There is a South Bend Lathe for most war production requirements. The Engine Lathes are made in 9″, 10″, 13″, 14½″, and 16″ swings, with bed lengths from 3′ to 12′. The Toolroom Lathes are made in 10″, 13″, 14½″, and 16″ swings, with bed lengths from 3′ to 8′. The Turret Lathes are made in 9″ and 10″ swings, with 3½′ bed lengths. These lathes are described in Catalog 100C which will be sent upon request.

SOUTH BEND LATHE WORKS

SOUTH BEND, INDIANA • LATHE BUILDERS FOR 36 YEARS



Overhead

APPLICATION of specially designed monorail cranes, using two bridges for carrier travel, had its inception in the aircraft industry, particularly in the Boeing, Consolidated and Martin bomber plants.

Handling materials and subassemblies in these huge plants involves a twofold problem. First, the areas over which materials and parts must be moved are so large that the conventional over-riding bridge crane is automatically eliminated. The girder depth necessary to span such areas would have added several feet to the building height and tremendously increased the cost of such long structures. Second, the method of assembly, necessarily spread over these large areas, requires crane type equipment capable of hooking on to a load at any point in the entire area.

To handle this job, twin bridges on trolley-mounted trucks were designed for travel along multiple runways with cab-carriers operating between the bridges. This, in effect, closely resembles a moving railway when looking along the length of a long twin bridge.

These underslung cranes, as well as the cab-carriers, are propelled by means of wheels with inflated pneumatic tires pressing against the bottom of the runways. Wheels are driven through a squaring shaft with sprocket and chain to

Top to bottom, left—

Fig. 1—This 3-ton bridge crane operates in bay over subassembly area; can be run on shuttle crane shown in Fig. 2 which allows transfer of this bridge crane to other bays in this area

Fig. 2—Shuttle crane shown here allows units like that shown in Fig. 1 to be transferred to other bays. Shuttle operation is controlled from crane cab through sliding shoe conductors

Fig. 3—Special expansion joint inserted in craneways at each of building expansion points allows 4½ inches of variation yet furnishes smooth uninterrupted travel for crane wheels

Fig. 4—How two 5-ton twin bridge cranes interlock for operation as a single 8-truck unit. Operator is running cab carrier unit over the twin bridge from the service spur shown in Fig. 6

By EDW. H. DOERGER
American MonoRail Co.
Cleveland

Railways

Speed Bomber Parts Handling at Willow Run

electric motor. Drum controls for all movements are contained in the cab. Maximum speed for all units except the hoist are approximately 300 feet per minute.

At the Ford Willow Run plant, dozens of these overhead railways, of various lengths and capacities, travel throughout the assembly areas on more than 29 miles of crane tracks. Seven separate systems are included in this trackage covering the various departments.

One of the problems first encountered in the Ford plant was in the sub-assembly area involving the movement of short-span cranes to run between the bays, Fig. 1. Loads on these cranes required transfer throughout the department in the course of production, and then to either of the main assembly lines.

In order to achieve this cross travel yet at the same time retain the overall coverage of crane equipment, American MonoRail engineers designed a shuttle unit, Fig. 2, which acts as a travelling craneway. With it, a short-span crane and its load can be transferred to any other set of runways between bays in the system. This eliminates hook transfer, permitting an operator to pick up a load and deposit it anywhere within the system.

Interlocks Aid Load Transfer

Perfect alignment of shuttles and cranes to accomplish such transfer is made possible by means of electrically-operated interlocks. These interlocks are operated from the cab by means of small drum controllers. The operator lines up his crane at the interlock connection. When the crane registers accurately, the interlock baffle is raised by a cam on the connecting track and at the same time closes a limit switch circuit which then enables the operator to use the drum controller. This insures connection only at the proper point.

The crane is then run across to the connecting tracks on shuttle or regular craneway. Shuttle cranes are propelled by the same rubber-wheel drive described above.

Runways for the short-span 3-ton cranes in the sub-assembly areas are cantilevered several feet into the main assembly area covered by 5-ton cranes, thus furnishing hook transfer between these areas.

Over each of the main assembly lines are eight crane tracks extending the length of the building, about 2800 feet. In order to maintain constant alignment, special slotted joints are inserted at each expansion point in the building. See Fig. 3. These joints provide for 3 inches of expansion, yet furnish smooth travel for crane wheels at all times.

Along each side of the eight craneway tracks travel 4-truck cranes, Fig. 4, of 5-ton capacity which can be latched together to operate as a single unit. This also permits one crane to pass another and move a load over the entire area without hook transfer. The two long assembly areas are linked together at strategic points by interlocking cross-over tracks so that cab-carriers can transfer from a crane on one assembly line to a crane on the other.

Covering the length of the preparation area is a 320-foot crane or travelling railway, Fig. 5, operating on 17 runways. This crane also serves as a cross-over connection between craneways in adjacent areas for through passage of carriers between departments. It is probably the longest crane of its type ever built. It is propelled by rubber wheels under each runway, powered by two electric motors through a single squaring shaft. Special expansion features were necessary to assure alignment with interlock-

Fig. 5—A 320-foot twin bridge crane in shipping area travels on 17 runways by means of 2-motor drive through square shaft operating rubber wheels under each runway. To assure correct interlocking with other cranes at each end, special provision for expansion is built into long crane

Fig. 6—Spur tracks at third level between assembly areas connect with interlocks at both ends to engage with cranes allowing cab carriers to be run in for service and repair

ing cranes at one end of this long crane. Expansion mechanism is operated by a crank so that adjustment can be made by operator in the cab.

Undoubtedly the most outstanding feature of the Ford installation is the facilities for servicing the cranes as well as maintenance of lights and other overhead equipment. Over the third level of the mezzanine section separating the main assembly areas hangs two spur tracks, Fig. 6, which have interlock connections for cranes in both areas. Carriers are run on these spurs for easy access to all parts for repair or replacement. Special maintenance cars, Fig. 7, propelled by a cab-carrier, can be moved on crane bridges throughout the system to replace lights or service overhead facilities.

Regardless of the extent and complication of this overhead railway system, is was found practical to train women as crane operators. Controls for all movement of cranes, shuttles, interlocks, hoists and carrier drives are mounted in the cabs, plainly marked and requiring little manual effort. The entire system was designed and built by the American MonoRail Co. of Cleveland, in co-operation with Albert Kahn, Associated Architects & Engineers Inc. of Detroit.

It is extremely difficult to show exactly how flexible this handling system is without presenting a detailed floor plan of the entire plant. However, it can be said that the more than 29 miles of crane tracks and seven separate systems included provide facilities to move work as desired about the entire plant. One really has to see this system in operation to appreciate its unusual features.

Its importance, however, lies not only in its extreme flexibility but in the extraordinary manner it makes every bit of floor space available for fabricating operations.

Fig. 7—Service car attached to cab carrier can be transferred to any part of plant. Car is attached to cab carrier operating on a crane bridge. By means of interlocks and cross-overs, this car can reach any area desired to service crane, light fixtures or other portions of the superstructure

Exide Ironclad ease of handling means increased dependability

Complex equipment is all right in its place, but today, Industry has a big job on its hands. Tools which are simple and easy to handle, save time, money, and materials. That's why Exide Ironclad Batteries, long known for their durability and dependability, are playing such an important part in the industrial war of movement. They shorten the training periods of new workers. They save materials through their long life . . . and most of all they do a big job and do it well!

ANY WORKER CAN FOLLOW THESE EASY MAINTENANCE STEPS . . .

Keep adding approved water at regular intervals. Most local water is safe. Ask us if yours is safe.

Keep the top of the battery and battery container clean and dry at all times. This will assure maximum protection of the inner parts.

Keep the battery fully charged—but avoid excessive over-charge. A storage battery will last longer when charged at its proper voltage.

Record water additions, voltage, and gravity readings. Don't trust your memory. Write down a complete record of your battery's life history. Compare readings.

If you wish more detailed information, or have a special battery problem, don't hesitate to write to Exide. We want you to get the long life built into every Exide Battery. Ask for booklet Form 1982.

1 **High Power, More Production:** To get the most from any battery-powered electric vehicle, its battery must deliver good voltage, hold that voltage high, and be ready for emergency demands with a giant surge when needed. Exide Ironclads do just that.

2 **Long Life, Saves Materials:** Rugged Exide Ironclads are built to last, and save vital materials by getting maximum use from everything that goes into their making. When you buy an Exide you definitely—Buy to Last and Save to Win!

3 **Easy Maintenance Saves Labor:** Exide Ironclads are kept charged by the simplest method ever devised. With the Exide Charge Control Unit there's nothing to do but connect the battery to the charging source and turn a knob . . . a job the greenest worker can handle.

THE ELECTRIC STORAGE BATTERY CO., Philadelphia
Exide Batteries of Canada, Limited, Toronto

Exide
IRONCLAD
BATTERIES

BACK THE ATTACK WITH WAR BONDS • LET'S OVER-SUBSCRIBE THE 3RD WAR LOAN

DESCALING STEEL By Spray System

By REGINALD TRAUTSCHOLD
Engineering Consultant
Passaic, N. J.

MARKED progress in the hydraulic descaling of hot-rolled steel by the so-termed spray system—that is, by the impingement of high-velocity water sprays upon the heated metal as it advances through the successive scale breaker and finishing sections of the continuous mill—has brought to light, not only the basic requirements for successful applications of this high-speed method for complete removal of scale from strip, plates, sheet bars, merchant bars and seamless tubing as and while the stock is being rolled, but certain troublesome complications, as well—complications that have at times seriously interfered with satisfactory output and quality standards.

The descaling action consists essentially in cracking-off, or loosening the scale from the sound metal by sharp thermal contraction and the physical shattering of the loosened scale and its removal by the impinging force of the water jets—both processes effected simultaneously without over-cooling the steel. Since descaling is independent of and distinct from the cooling of the steel being rolled, which later involves low-pressure water-cooling of the stands of rolls, an extremely exacting thermal balance is involved, little difference existing between the coefficients of contraction of the objectionable scale and of the sound metal. The question of water pressure, likewise, is critical, as well as the quality of the water employed and, since the objectionable scaling is progressive, the location of the high-pressure sprays is highly important.

From 4 to 12 gallons of high-pressure filtered water per minute per inch width of slab or stock surface have been found necessary in practice. The advisable quantity depends upon the type of mill, width and weight of slab, speed of mill, i.e., time consumed by the slab in passing through rolls or stands and between successive stands—the number of slabs in transit at the same time, location and number of spray points and volume of spray. The water pressure may range from about 600 to 1300 pounds per square inch, or even higher in some instances.

Intricacies of Operation

Selection of water pressures, location of sprays, etc. at some of the mills where hydraulic descaling is now being used most successfully, and strip of highest quality produced at reasonable pumpage expense, with accompanying low maintenance cost, will provide excellent firsthand evidence of the intricacies of modern descaling practice. At one of the more prominent Ohio mills, the water pressure at the spray nozzles is close to 1000 pounds per square inch. At another of the important mills in the same general locality, the hydraulic pressure employed is 200 pounds higher, while in the tin mill of a steel plant in the Chicago district the spray pressure is built-up to some 1300 pounds per square inch. Each of these installations is typical of methods which have been approved for hydraulic descaling. Take the 1200-pound application as an example. This is in connection with a 12-stand 98-inch strip mill employed for a variety of work and the pressure selected was established only after extensive investigation of specific requirements for obtaining satisfactory (scaleless) surface finish within the safe pressure range of available piping materials and standardized pumping equipment. Studies were made of the water demand on various rolling schedules, limiting the velocity of flow arbitrarily in any portion of the high-pressure system to some 24 feet per second and avoiding all abrupt changes in direction of flow in the vicinity of high-velocity lines.

Spray nozzles then were located on the delivery side of the No. 1 scale breaker, at the entry side of No. 2 roughing stand, entry side of No. 3 rougher, entry side of No. 4 rougher; at the delivery side of No. 2 scale breaker, on entering the finishing mill section, and on the delivery side of No. 5 finishing stand. Nozzles on the No. 1 scale breaker, 16 in number, are six special 1-inch Republic Steel Corp. devices spaced 8 inches and directed against the top of

the heated slab from a maximum distance of 17½ inches and ten ½ x 1/16-inch spray nozzles on 4½-inch centers directed against the under side of the slab from a distance of 9½ inches. Sixteen ½ x 1/16-inch spray nozzles are used on each of the Nos. 2, 3 and 4 roughing stands on 6-inch centers, 12 inches above and below the forming sheet. The nozzles are mounted at an angle of some 15 degrees against the direction of slab flow to effect efficient loosening and removal of the scale.

Sprays on the No. 2 scale breaker consist of a double battery of twenty ½ x 1/16-inch spray nozzles on 4⅛-inch centers mounted 9¼ inches above and below the slab. The nozzles also are inclined at 15 degrees against the advance of the formed sheet. Sprays on the No. 5 finishing stand are seldom used, the descaling sprays at the No. 2 scale breaker ordinarily removing the last trace of scale forming on the cooling sheet.

The nozzles at each stand are provided with closing-caps, to adjust the overlapping spray spread to the width of the strip rolled avoiding unnecessary pumpage and conserving filtered water. When rolling a 94-inch sheet, the maximum peak demand for high-pressure descaling water has been about 2500 gallons per minute and the maximum average demand 1500 gallons.

Substantial water supply is normally furnished by one or another of three De Laval duplex centrifugals, each of 1200 gallons per minute capacity, with one of the other pumps serving as a standby or reserve unit. Each pump assembly consists of a 2-stage low-pressure booster pump charged from a 13,000-gallon surge-pipe protected, tank reservoir of filtered water, from which every trace of abrasive material has been carefully removed, and a 7-stage high-pressure centrifugal. The combined pump unit, mounted on a common subbase, is connected by a flexible coupling to a 1200-horsepower, 1800 revolution per minute, 3-phase, 60-cycle, 2300-volt induction drive motor.

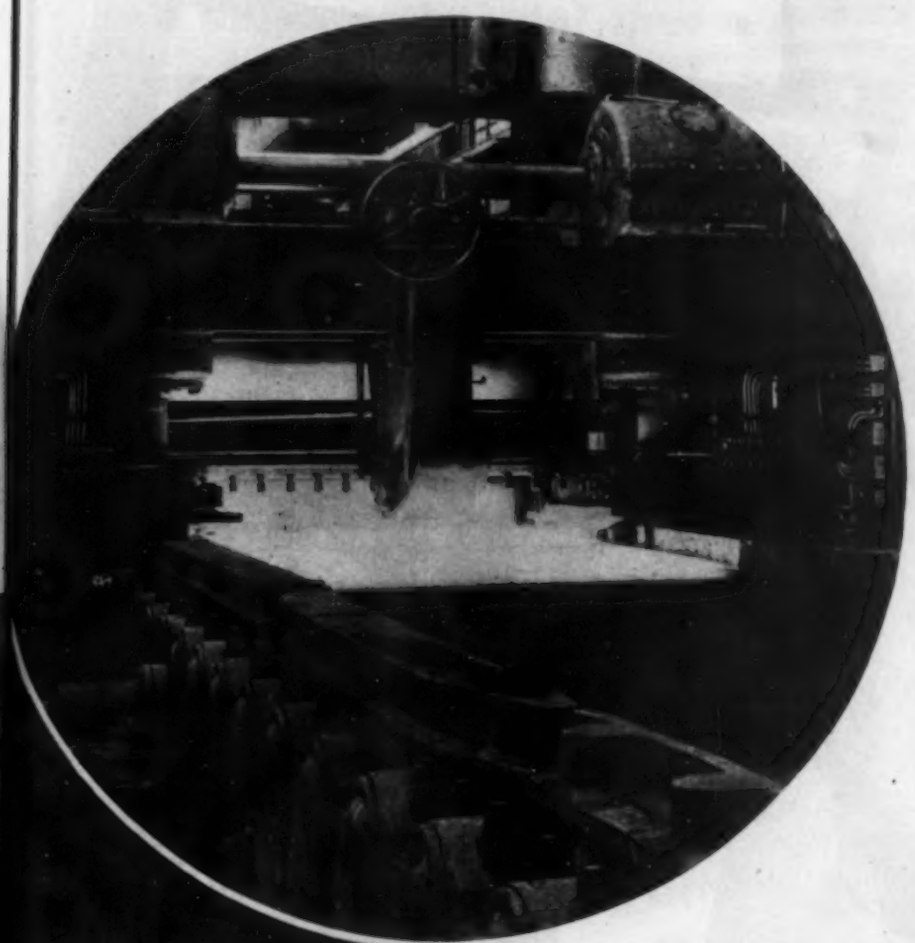
The pump control circuit is so interlocked with the control of a motor-operated gate valve in the discharge line of each pump unit that, while closing the valve automatically when the current is off, the pump can only be started when the gate valve is open. Also, a trip on the oil circuit breaker is interlocked with the pressure switch on the pump suction and with a temperature switch on the balance pipe of the pump, opening the circuit breaker immediately in cases of suction drop, below an established minimum, and when there is an increase in temperature in the balance pipe, above a predetermined limit.

Emergency By-Pass Valve Provided

Each pump also is provided with a solenoid-operated air valve that opens an automatic by-pass valve to the filtered water tank. This self-acting device functions if and when for any reason the motor current drops below that corresponding to the shut-off load on the pump.

The discharge from the pumps passes direct to the main header serving the various descaling stands and also, through an automatic safety shut-off valve, to a hydropneumatic accumulator of 4000 gallons capacity that under normal operating conditions is kept about one-third full of water under full system pressure by a 3-stage air compressor, with inter and after-coolers, operated under manual push-button control. The regulation of the accumulator safety valve is automatic, however, effected through the agency of a special liquid-level controller and recorder with high-level contact arranged to close a warning signal light circuit and low-level contact to close, likewise, the light circuit by opening the circuit on a solenoid air valve. Thus, the safety valve is instantly closed whenever the water level is low and in case a break should occur in the hydraulic lines or any failure in the operation of the pump, air supply or electric current.

Another special detail of this installation is worthy of mention, and that is, the low-pressure filtered water-filling connection made below the descaling spray valves, to maintain the piping and spray headers beyond the spray



Above—Spray nozzles for high-pressure water are shown above the hot steel. Courtesy, Republic Steel Corp.

Left — No. 4 roughing stand, 79-inch train, equipped with high-pressure sprays. Courtesy, Youngstown Sheet & Tube Co.

Look

The best test of any soaking pit is what it does in action. For 17 years the one-way-fired, pits built by Surface Combustion have been doing a job in American steel mills. Witness the many pits bought by one big steel company, shown on the opposite page. More and more as engineers have seen these pits at work in their own mills they have come to rely upon them exclusively.

See these pits in action. Talk to the men who run them. Surface Combustion one-way-fired soaking pits operate on any commercial fuel. They're built to take punishment and to give service.

Simplest Construction
Greatest Capacity
Most Efficient Firing
Best Heat Distribution
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SC SURFACE

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at the Facts!

The best testimonial that a steel mill can give a manufacturer is to come back time and time again for more of the same pits.

HERE'S THE RECORD OF ONE OF AMERICA'S BIG STEEL COMPANIES

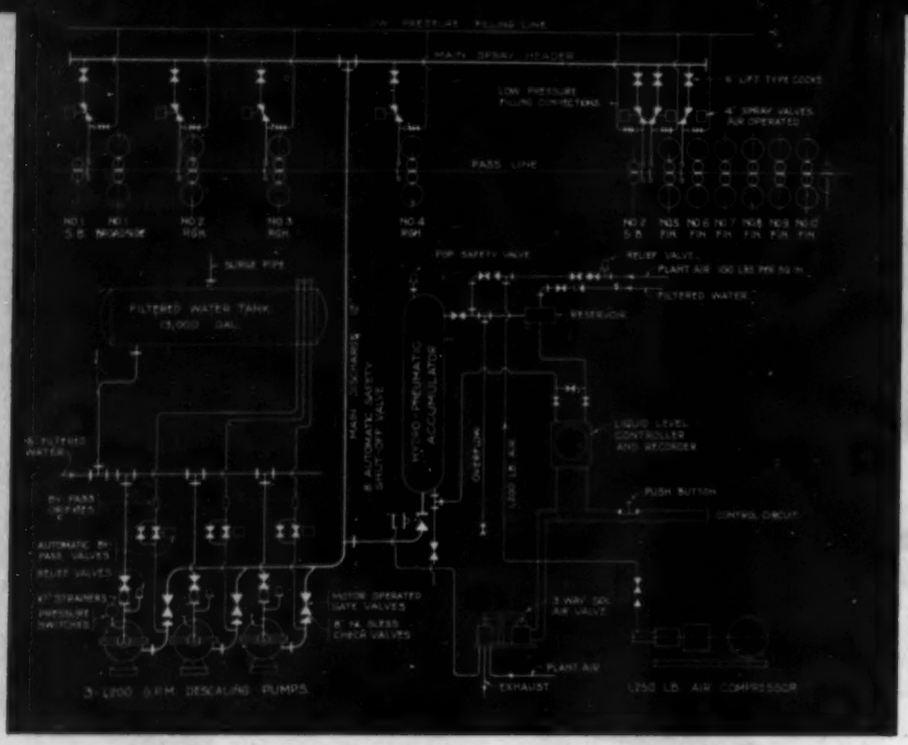
DATE ORDERED	LOCAL PLANT	NUMBER OF SURFACE COMBUSTION PITS ORDERED
DEC. 1927	PLANT A	5 PITS
MAR. 1929	PLANT B	4 PITS
MAR. 1929	PLANT C	7 PITS
NOV. 1931	PLANT D	4 PITS
DEC. 1936	PLANT A	4 PITS
NOV. 1940	PLANT B	5 PITS
JUNE 1942	PLANT E	24 PITS
JAN. 1943	PLANT A	3 PITS

TOTAL 56 PITS

SC Gas and Oil Fired Equipment For Every Industrial Need: FORGING, NORMALIZING, ANNEALING, HARDENING, DRAWING, HEATING, CARBURIZING, NITRIDING. SPECIAL ATMOSPHERES. FOR DRY BLAST USE SC KATHABAR MOISTURE CONTROL SYSTEMS.

Combustion

JANITROL GAS-FIRED SPACE HEATING EQUIPMENT · KATHABAR SYSTEMS FOR DRY BLAS



Layout of descaling system serving 4-high continuous mill

valves full of water between spraying periods. The safeguard consists of a relatively low-pressure filling line paralleling the main header and connected into each high-pressure spray stand. The object is to protect the spray nozzles and connecting piping against the hammerlike crushing impact, on valve closing, of suddenly released water traveling at a rate of better than 16 miles per hour.

Naturally, all pipe fittings are of extra-heavy welded construction and at each spray valve there is a connection with a straightway lift-type cock with a balanced piston-type air-pilot-operated spray valve for the avoidance of line shocks and regulation of speed of valve manipulation, providing uniform acceleration or deceleration as desired. The spray valves are controlled manually in the pulpits or on the tables through flag switches operating 4-way solenoid air valves placed close to the spray valve.

Sensitive thermal balance entailed in a successful hydraulic descaling system of this kind is well demonstrated in the case of the spray installation at the tin plate mill in the Chicago district, where the satisfactory hydraulic pressure is some 1000 pounds per square inch higher or 8 1/3 per cent. The increase is made necessary by the lighter weight strip rolled and the descaling of which limits the amount of water that can be employed without too rapid cooling of the lighter mass of heated metal. Efficient surface scale loosening is effected with less water and the heavier impact pressure aids both in breaking-up the loosened scale and its removal.

Spent descaling water, which of necessity is 100 per cent makeup water, mixing with the low-pressure roll cooling water escapes to the scale pit, where it settles and can be reused after passing through mechanical strainers for roll cooling purposes but decidedly not as descaling water. In fact, the quality of the filtered water used in the sprays is of the utmost importance.

At one mill where a system of descaling by the spray system had been installed, loss of production and persistent lowering of descaling effectiveness was eventually traced to a baffling clogging of the spray nozzles, despite the fact that the carefully filtered descaling water was physically clear and free from suspended matter on entering the filtered water tank serving the descaling pumps. Analysis of the water showed that clogging was caused by a combination of microbiological slime growths and bacterial corrosion in the lines leading to the jets—that no amount of care in filtration could exclude completely from the filter effluent.

Suitable chlorination of the water supply destroyed the slime-forming and corrosion-causing bacilli correcting the condition. The water treatment restored the descaling efficiency of the system promptly and arrested both corrosion troubles and the slime growths.

The microbiological hazard is not uncommon. Numerous varieties of water-borne organisms pass through the filter bed and under favorable conditions attach themselves to pipe lines and tank surfaces, in joints and water traps. Here they propagate and rapidly multiply to form filamentous growths and jelly-like accumulations which entrap any minute particles of rust and dirt that may be present. A matrix builds up, often of inorganic appearance, that not only restricts the free flow of water but may break up and clog passages. Any tendency to corrosion troubles is intensified, further aggravating effective scale removal.

Modern descaling practice is exacting, yet the intricacies are clearly susceptible to control and the major requirements of finished steel plates for present-day markets—that of surface finish of the highest quality—can now be realized speedily and dependably at reasonable cost by a well-engineered hydraulic descaling system. The complete removal of all blemishing scale from the hot strip can be effected advantageously as it is rolled on the mill.

Welding Fluid Reduces Effects of Fumes

Welding fumes and vaporization of zinc can be materially reduced at least 30 per cent by the application of No-Spat, its manufacturers, the Midland Paint & Varnish Co., Cleveland, reported recently. A comparison of the vaporization showed untreated galvanized iron after each 2-minute test weld vaporized 0.107-gram of zinc. While on the galvanized iron treated with No-Spat only 0.074-gram of zinc was vaporized, according to the company.

To make the test, one series of samples was treated with welding fluid, while the other series was untreated. A welder using an oxyacetylene torch did the actual welding work. Each weld was stopwatched to 2 minutes and the torch removed after which the accumulator pump was allowed to operate an additional 2 minutes to accumulate all the fumes and vapors. Even before the comparison of vaporization was made, a reduction in fumes and smoke was noticeable to the eye on the work which was undergoing the treatment.

Reamers Are Ground from Hardened Steel Blanks

Barber-Colman Co., Rockford, Ill., now is in production on a line of ground-from-the-solid reamers ranging in size from 0.050 to 0.500-inch and guaranteed to cutting accuracy within plus 0.0002 and minus 0.000-inch. These are for use on fine precision work demanding smooth finish, work such as aircraft parts, guns, instruments and small textile machinery details.

The reamers, each of which is engineered for the particular job it is to do, are made from hardened steel blanks, centerless ground to the specified cutting diameter, then fluted by grinding longitudinally from the solid. The method avoids hardening distortion and precludes minutely "dubbed" cutting edges. Diameter having been established within tenths before grinding the flutes, no measuring across the flutes is considered to be necessary.

Cylindrical cutting lands are unusually smooth, and the fine finish in the flutes, which are shaped in each case to suit the material to be cut, insures maximum cutting ability, free flow of chips and long life for the tool.

INDUSTRY USING OVER 12,000 PM MANUALS

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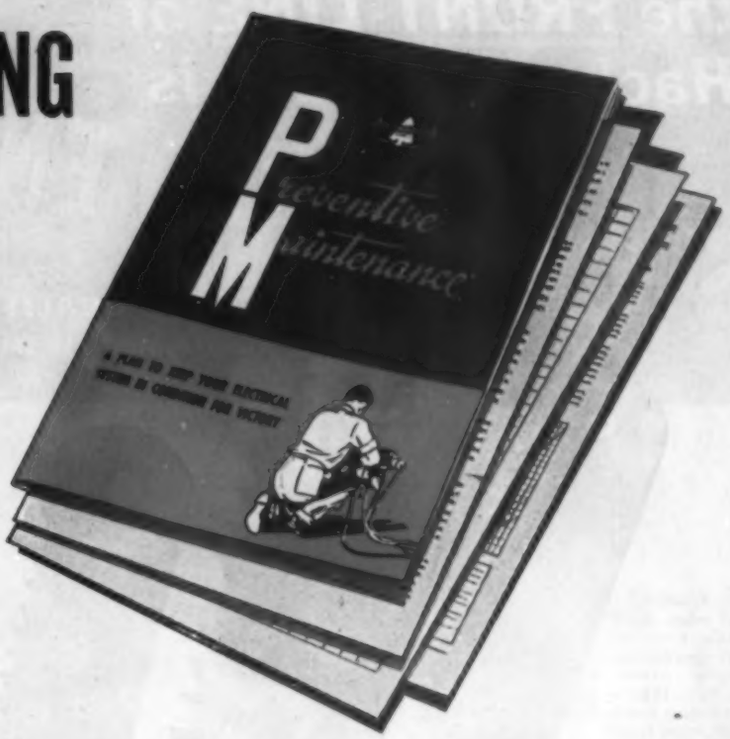

Though introduced only recently, Anaconda's Preventive Maintenance Plan is already helping many plants maintain continuous production by keeping their electrical systems operating *efficiently*—despite shortages in essential wiring equipment.

To date, over 12,000 Plan Manuals have been sent to industrial concerns alone. Plant management is using them to protect the electric wire and cable on hand . . . to see that these vital copper products are being properly used . . . to detect hidden electrical weaknesses that can be corrected.

WHAT THE PLAN IS

The PM plan is a simple but comprehensive way to safeguard war production by preventing electrical breakdowns *before they develop.*

HOW IT WORKS

The plan provides a practical means of making periodic, systematic analysis of circuits and equipment. Uncovers potential weaknesses . . . suggests ways to correct them . . . prevents overloading of lines.

Data thus gathered aids local W.P.B. Branches in reaching decisions on requests for materials to *prevent* breakdowns.

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The PM plan helps utilities maintain close customer contact despite a lack of "something to sell." Offers basis for service campaign that definitely appeals to customers. Puts the utility in a leadership role for furthering war production throughout the area it serves.

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Gas Carburizing

(*Continued from Page* 96)

the work in its travel are returned to the charging end of the furnace. In reality the man who charges the furnace also unloads it at the same end at the completion of the series of operations subsequent to carburizing. A number of installations like this now are in operation.

In addition, it has been found desirable in some instances to use these furnaces for a variety of different parts, requiring cases of different depths. This has been made possible by the development of a multiple-row furnace, so arranged that the "pushing" time of each row may be adjusted to produce any desired case depth. In this way, each of the rows may be operating together or independently of each other.

It may be interesting at this point to review the course of development that has taken place in these units since the time of the early installation. Only in this way will it be seen how logical this development has been and how the various matters of importance which have come up have added in their solution to the knowledge of the general art of carburizing.

Handicaps To Efficient Gas Carburizing: It is impossible in an article of this kind to consider in detail all of the interesting matters which have come to light in the operation of these units. These have been for the most part matters of operating procedure connected with handling the work in such a manner as to obtain best results. In this respect, they are associated with local plant operations and the parts being handled.

However, there are a number of matters which turned out to be definite limitations of the process as originally devised and which have been successfully overcome in the present day installations. These limitations which have shown themselves throughout the years as definite handicaps to be overcome may be listed as follows and will be considered in this order:

A—The alloy problem.
B—Carbon deposit on the work.
C—Richness of the atmosphere.
D—Carbon content of the case.
E—Size of muffle.

A—The Alloy Problem: This may best be considered under two different heads —first, as affecting the alloy of the trays and fixtures and, second, as affecting the alloy muffles. There was considerable difficulty in the early days with the trays and fixtures used for supporting the work in its travel through the furnace. These tended to fall apart after being in use for some time and frequently failed within the furnace, thereby causing an upset.

Such trays were usually made of an alloy containing 35 per cent nickel and 15 per cent chromium, which is the same alloy that is being used today for the same purposes with entire satisfaction. Examination of the alloy at that time revealed that the trouble was not in the alloy itself but in the metal cast-

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The safe, effective, economical way to prepare steel shell cases, shells and other steel ordnance parts for the protective finish.

The substitution of steel shell cases for brass is one of the major accomplishments of American ingenuity in the present war. Details of drawing, annealing, finishing, etc., have been successfully worked out in plants and Government Arsenals where these problems were not entirely new.

The need for unusual protection of the finished shell case against rust in overseas shipment and use under severe climatic conditions, however, presents a new and serious problem to many manufacturers.

The best finishes available fail under severe exposure conditions if the surface on which they are applied is not clean chemically as well as mechanically, free from invisible rusters as well as visible rust. The DEOXIDINE process is admirably suited to the proper preparation of the metal to receive and hold a durable protective finish so necessary for "successful missions." The often overlooked, though important detail of proper rinsing in slightly acid solutions is accomplished with DEOXYLYTE as a part of the DEOXIDINE process.

The success of the steel shell case and all other ordnance parts in combat will depend upon close adherence to such seemingly unimportant details.

DEOXIDINE meets U. S. Ordnance Department requirements in removing rust and neutralizing rust producers before protective finishes are applied.

ACP will help in guiding you in the proper preparation of steel shell cases, shells and any other ordnance parts to receive the specification finish. Descriptive literature will be sent on request.

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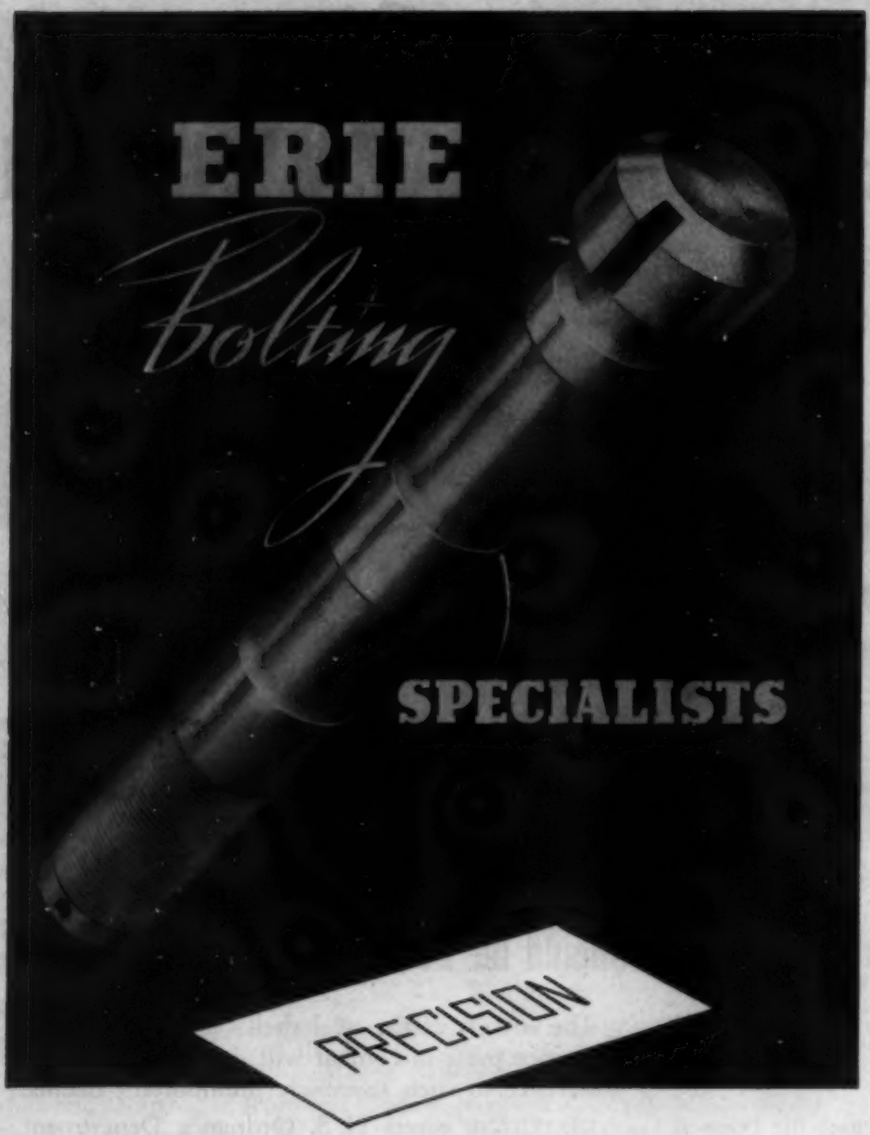

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ing technique, which permitted shrinkage areas within the body of the casting not apparent from the outside. When these castings were subjected to repeated carburization as they were used over and over again in continuous operation, these shrinkage areas became filled with graphitic carbon which continued to build up until it had developed a pressure within these areas that was greater than the strength of the metal at the carburizing temperature.

As a result, eventually a kind of explosion took place within the tray, forcing it apart with a sort of cauliflower appearance in the fracture. It should be noted especially that the kind of carburizing gas used in these days was very rich in hydrocarbon. These gases penetrated the shrinkage areas which seemed to catalyze their breakdown so that the resulting carbon tended to build up in these areas to such pressures that rupture occurred.

Contrasting Carbon Buildup

The action of these gases on the carburizing muffle seemed to be different. Carburization occurred in such a manner that the face on the inside of the muffle in contact with the carburizing gas reached a very high carbon value, but the outside face being exposed to the gases of combustion used for heating was subjected to a carbon removal process which caused the outside surface to be low in carbon while the inside surface was high in carbon.

In reality the thing that was occurring was that the carbon which entered the muffle on the inside was diffusing slowly through the structure and being removed at the outside during the course of normal operations, apparently limiting the carbon buildup in the interior face. This action did not seem to affect the life of the muffle nor was there ever any time so far as is known when a muffle failure occurred in a manner similar to that of the trays and the fixtures just described above.

The early muffles tended to fail by pulling apart at the joints. Different types of construction were used. Sometimes they were bolted; sometimes they were bolted and welded, but the remedy seemed to be principally in maintaining the muffle under pressure at all times so that the push of the work moving through the muffle was resisted by springs at the discharge end of the muffle, the arrangement being designed to keep the structure under compression at all times. In this way, the muffle life has been materially increased so that at present this does not constitute a large item of expense.

B—Carbon Deposit on Work: In some of the early installations, especially where butane or propane was used as the carburizing gas, there was some difficulty connected with the form of the free carbon deposited on the work during carburizing. In some cases, the carbon was present as free carbon or soot, which seemed to have no deleterious effect upon carburization but made the work dirty

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A typical 27 x 36" Wheelabrator Tumblast load of forged micrometer frames at the Rhode Island Tool Co., Providence, R. I., requires only five minutes to remove scale from the 800 pound load.

Park Drop Forge Co., Cleveland, Ohio, has been cleaning 13 to 15 diesel engine crankshafts measuring 54" long and 3" diameter, weighing 200 lbs. each, in 10 minutes with their 48 x 72" Wheelabrator Tumblast.

A 20 x 27" Wheelabrator Tumblast is used by an eastern tool manufacturing company for cleaning a variety of carbon and high speed drills, taps, cutters and reamers. Typical loads consist of from 1,000 to 2,500 pieces and require an average of 15 minutes cleaning compared with 4 hours with previous equipment.

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and objectionable from the standpoint of handling.

Another form of carbon encountered at this time had the appearance of a scale and occurred on different parts of the load of work and frequently interfered with carburization to the extent of preventing it almost entirely in certain spots. For instance, in the case of a ring gear, the entire gear would be carburized uniformly except in certain spots underneath a layer of carbon scale where carburization had not been effective at all. As a result of this, carburization was found to be spotted and uncertain, since the absence of carbon in these areas resulted in a softness which might appear in any portion of the gear.

Each of these forms of carbon could be traced to definite conditions of the carburizing gas, and it was necessary to eliminate both of them. The presence of free carbon on the work in the form of soot is traceable directly to the use of a rich carburizing gas. At high temperatures gases containing large amounts of hydrocarbon break down and liberate free carbon. This coats the work while passing through the high temperature zone and comes out as dirt in the form of free carbon or soot.

Carbon Deposition Zone Effective

It will be recalled that in the continuous gas carburizing process as originally described, there was a zone in the furnace wherein the deposition of carbon or soot upon the work was fostered. It will be recalled also that this carbon deposition zone was located at the charge end of the furnace and was effective at a time when the work was being raised to carburizing temperature. This carbon deposition zone is still an effective part of the process as practiced today, and must be clearly distinguished from the carbon which covers the work in the high temperature zone and comes forth as dirt on the work. The one is a low temperature phenomenon essential to carburization. The other is a high temperature phenomenon resulting from the use of a rich hydrocarbon atmosphere.

The formation of carbon scale or coke upon the work during carburizing became an important factor first of all when butane or propane was used as the carburizing gases. In the commercial form, these gases usually contain varying amounts of unsaturated hydrocarbon compounds. When these gases passed through the low temperature or carbon deposition zone of the furnace, they went through a series of reactions whereby they deposited carbon as desired but formed also some high boiling point tars which condensed on the cold work as liquid products. When these entered the high temperature reaction zone, they were converted into carbon scale or coke, which was responsible for spotty carburization of the work as it has been shown. Methods have been developed which overcome both of these objections so that at the present time they are no longer a factor in the car-

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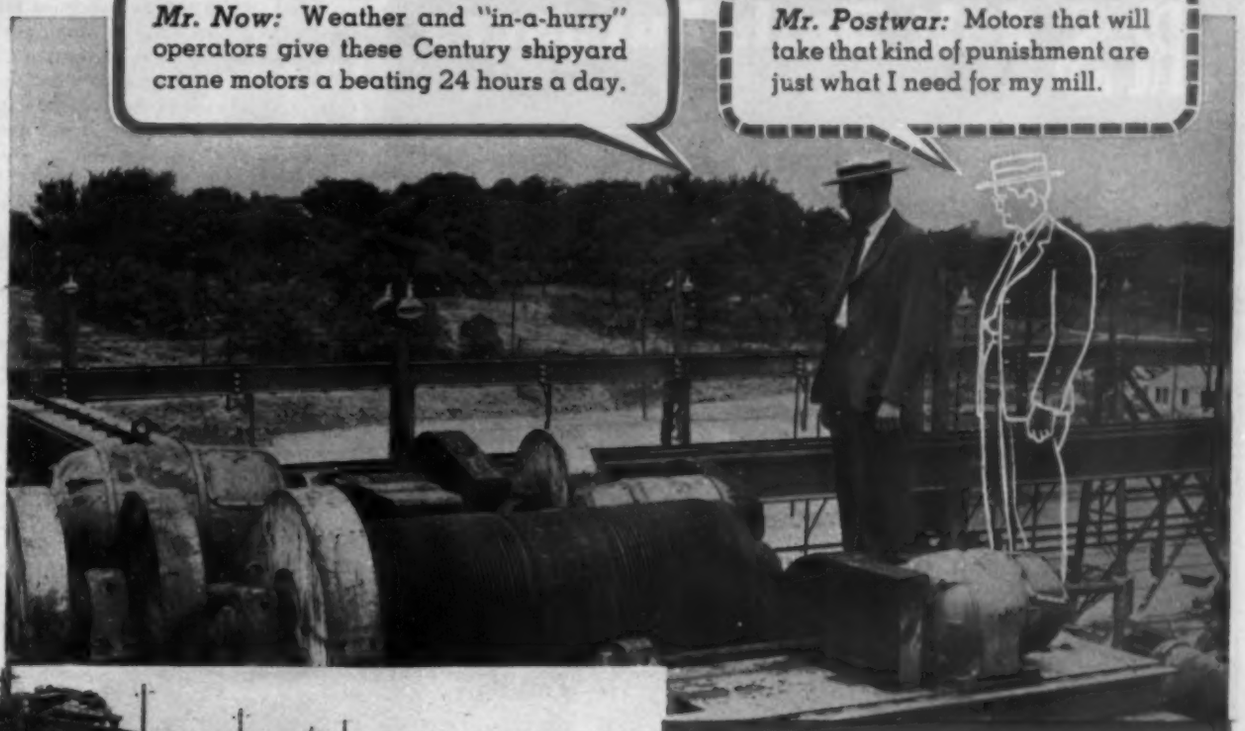

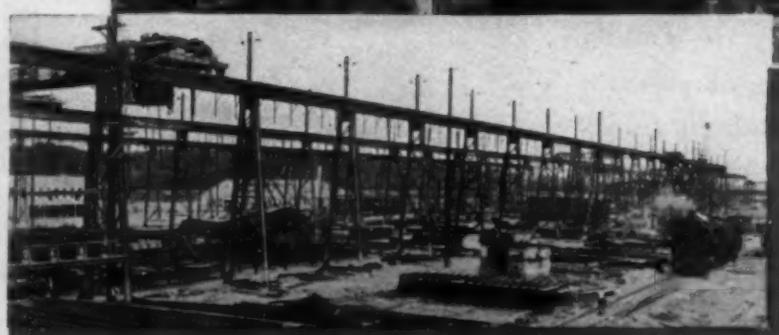

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burization procedure. These will be described in a subsequent section of this article.

C—Richness of the Atmosphere: As pointed out in the two sections just preceding, the handicaps encountered in the development of gas carburizing were traceable in each case to the use of an atmosphere rich in hydrocarbon gas. It might well be asked why it was necessary to maintain so rich an atmosphere when its effects were so deleterious. The answer is to be found in the limitations imposed upon the process in the act of introducing work into the muffle and removing it from the muffle, during operation.

Atmospheric Changes Limited

At these times when the muffle chamber was opened at one end or the other, an influx or non-carburizing gas lowered the effectiveness of the gas remaining in the muffle to a point where a further reduction of hydrocarbon would interfere with carburization. These periodic changes of atmosphere produced a kind of surging treatment which had been found to be beneficial in other connections. In the subsequent development it became necessary to take greater pains to insure a tight muffle and the absence of gases which would hinder the operation.

D—Carbon Content of Case: In the carburization of certain steels, particularly those containing liberal amounts of the usual alloying elements, it was found necessary to control the carbon content of the carburized case within narrow limits. This had an effect upon the formation of austenite during quenching, which was objectionable for certain types of work. There were other reasons also which made it desirable to control the carbon content of the case sometimes at one value and sometimes at another, depending upon the particular application. In the process as originally set forth, it was impossible to do this without encountering difficulties.

To produce a high carbon case resulted in the formation of a large amount of free carbon which made the operation dirty and otherwise objectionable. To produce a low carbon case required too much time, since the carburizing potential of the atmosphere was low and the rate of diffusion slow. It was usually better in this case to carburize to a high value and then allow the carbon to diffuse to the desired lower value.

In either case, the process as originally presented lacked flexibility in these regards, and this had to be overcome by subsequent developments in design.

E—Size of Muffle: The original furnace had a single muffle in it designed for handling one line of work only. The reason for this was the difficulty involved in casting larger metal muffle sections. As these sections increased in size, it became increasingly difficult to produce sound castings and to mount them satisfactorily in a furnace structure. This limitation was overcome by the use

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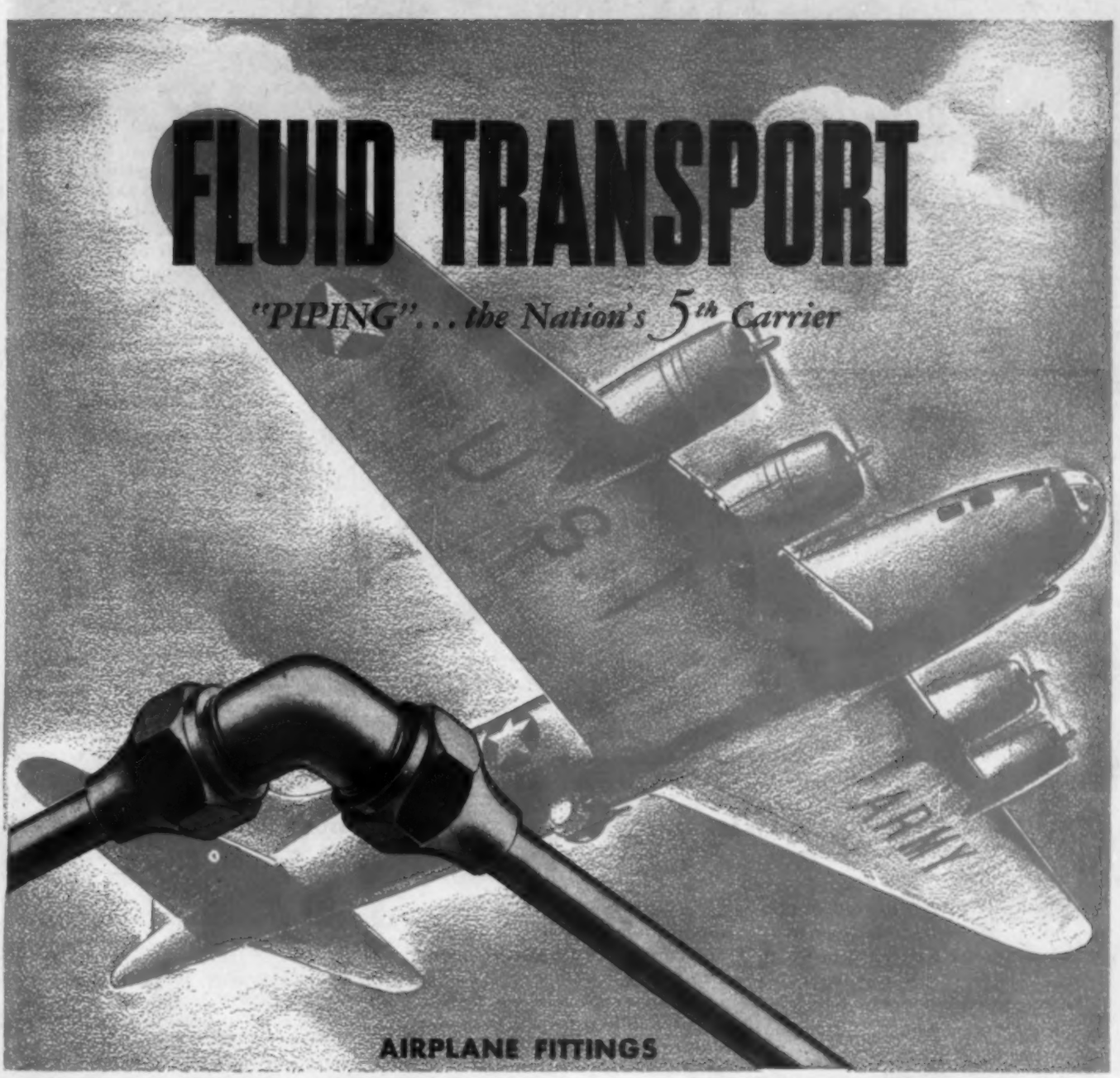

AIRPLANE FITTINGS

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From the most delicate of airplane systems, to rugged 16" high pressure-high temperature steam lines of power plants, Grinnell supplies the component parts plus expert engineering to convert a pile of pipe into a piping *system.*

For new war construction, or maintenance and repair of existing piping, call Grinnell Company, Inc., Executive Offices, Providence, Rhode Island. Plants and offices throughout U. S. and Canada.

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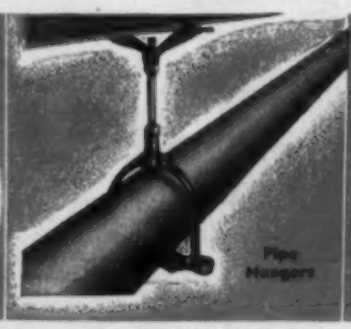
Pipe Hangers

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Deep-drawing made it light and strong enough to fly

This cylinder, a reservoir of hydraulic energy for aircraft use, is another example of the way in which the Hackney Deep-Drawing Process helps manufacturers strengthen and reduce the weight of parts simultaneously.

Hydraulic energy to feather propellers, operate landing gear, flaps, etc., requires accumulators which are light in weight, yet are strong enough to withstand high internal pressures.

Hackney engineers co-operating with the accumulator manufacturer developed a cylinder to meet the exacting specifications. Unnecessary weight was eliminated and uniform sidewall thickness was assured by cold drawing. Ample strength was assured by electrically controlled heat-treating.

In addition to successfully meeting the weight-strength requirements, the Hackney Deep-Drawing Process makes important savings in time and materials as no machining is required for weight reduction in producing these improved products.

If you have a problem which deep-drawing might solve, let Hackney's engineers help you. Their experience may enable you to overcome manufacturing difficulties, meet war material limitations or effect product improvements. Write for details.

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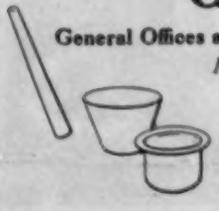


DEEP-DRAWN
SHAPES AND SHELLS

of radiant tubes as heating elements within a tight refractory enclosure.

The above list of handicaps represents the limitations that have developed to date in the operation of these furnaces which have been responsible for the subsequent improvements that have made the continuous gas-carburizing furnace the precision tool that it is today. It will be in order at this point to trace the various steps taken and the reasons for the methods now being used. This will be done in the concluding portion of this article which will appear in the September 27 issue.

(*Concluded Sept. 27 Issue*)

New Grease Absorbent For Floors Is Fireproof

A new fireproof oil and grease absorbent and floor cleaner, called Absorbo, is announced by Fidelity Chemical Products Corp., Newark, N. J. It is said to absorb up to 45 to 50 per cent of oil or grease by weight. The product is odorless, nonpoisonous and noninjurious to skin, clothing or flooring.

Though granular in form, the cleaner is nonabrasive and will not damage machinery or working parts due to abrasive action. The product is listed by the Underwriters' Laboratories as a class 1 noncombustible absorbent "for reducing fire and slipping hazards and for cleaning floors."

Issues Revised Standards On Carbon Brushes

A revised edition of the "Carbon, Graphite and Metal-Graphite Brush Standards", publication No. 43-85, devoted to standard dimensions and tolerances for brushes, and standards for associated parts of brushes such as cables, clips, and connections, is announced by National Electrical Manufacturers Association, 155 East Forty-fourth street, New York. Copies of the pamphlet, which supersedes the one issued in 1934, are available from the association's headquarters.

Welding Machine Takes On Riveting Job

Equipment originally developed for resistance welding is now being used to rivet stamped assemblies, Progressive Welder Co., Detroit, reports. Equipped with an indexing table, the machine hot-upsets and rivets in place vanes of hydraulic flywheels. The ends of the vanes are positioned through holes in the faces of assembly rings. Then "electrodes" of the welder are brought down under pressure against them, heating and at the same time upsetting the ends to rivet the parts securely.

Right amount of heat is provided by conventional welding timers combined with a lower current density than used for welding.

DO-ALL *Cuts any material*

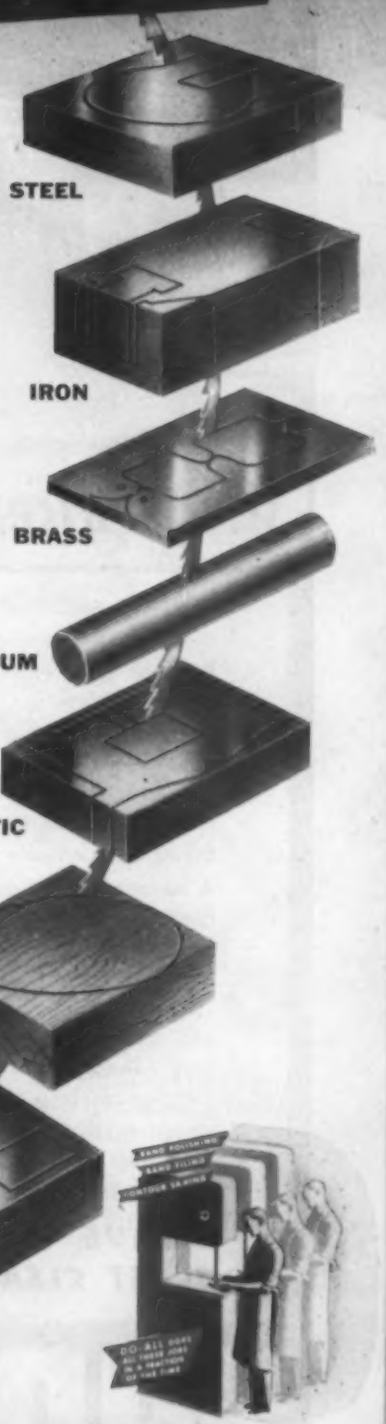
What have you that needs quick, smooth cutting—Metals? Alloys? Plastics? Plymetals? Rubber? Laminated Products? Composition Materials?

Armed with a DO-ALL Contour Machine and a supply of tough-edged DO-ALL Band Saws, you can tackle any internal or external sawing job — flats, bars, tubing, blocks a foot thick, stacked sheets, etc.

Just thread the DO-ALL with the proper band saw and you have ready for instant use Today's Fastest Machining Method—Meets the Challenge for Greater Production.

Six models — built for greater speed and a smoother finish — priced from $1,000 to $5,000 with motors.

Everyone interested in advanced shape cutting methods, should see the 265-page DO-ALL Handbook giving details about this amazing machine. Free copy on request.



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DO-ALL Offices in 25 cities, with a staff of trained engineers to give you quick service on Contour Machines, Band Saws and Files, Gage Blocks and Surface Grinders.

saves priceless CUTTING TOOLS

CURRENT SHORTAGES in cutting tools are so "fraught with danger to the war program" that the War Production Board has issued an appeal for drastic conservation to the entire metal industry.

The machining of imperfectly cleaned castings, forgings and heat treated parts—those having minute grains of sand burned into their surfaces, or hardened scale still clinging to their heat treated surfaces—makes one cutting tool extravagance that industry can easily, *and quickly*, eliminate.

A blast cleaned part—produced by Pangborn Air Blast or Rotoblast equipment—is cleaned down to virgin metal. No sand or scale is left to destroy cutting tools—hence extra long life for those priceless items. Blast cleaning also discloses flaws and fissures that otherwise would not be noticed until after machining operations had gotten well along the way. These two savings alone often repay the cost of blast installations in a short time.

Airless ROTOBLAST Barrels, Tables and Special Machines are available for most work—and Air Blast Rooms and Cabinets for unusual or heavy work. Catalogs on request.

SAVE YOUR CUTTING TOOLS!
BLAST CLEAN WITH "PANGBORNS"

PANGBORN

WORLD'S LARGEST MANUFACTURER OF DUST COLLECTING AND BLAST CLEANING EQUIPMENT

PANGBORN CORPORATION · HAGERSTOWN, MD.

Tin-Conserving Solders

(*Continued from Page 97*)

the solder breaks down and spreads. The area thus covered may be measured by a planimeter and compared against that obtained with a known solder.

By using a flux to provide the wetting action that is so necessary, flowability and spread can be increased to an extent that it even surpasses that obtained by 50/50 tin-lead solder. It will be noted, however, that the new type flux had very little or no beneficial effect on the high-tin solders or on the 5/95 tin-lead alloy.

Tinning and Coating: Early in 1942 the Canada Metal Co. began an investigation of the problem of "tinning" such things as wire, cable, chaplets, and so on. Formerly, in the days of plenty, when there was no apparent need for the conservation of strategic metals, tin was used 100 per cent for these particular jobs. A series of experiments on this problem resulted in the development of an alloy containing only 10 per cent tin which satisfactorily answered all the requirements of a good tinning job. Of course, it was necessary to introduce other elements into the alloy in order to balance changes in wetting power fluidity and normal operating temperatures, resulting from the reduction of tin content. In all recent developments of new alternate alloys, particular care has been exercised to avoid substitution for tin by some other metal equally as difficult to procure. There has been every endeavor to produce alloys from elements yielded by Canadian mines.

The tinning alloy containing only 10 per cent of tin has been in use in several plants for over a year and has given a favorable account of itself in all instances. Thus, it is readily seen that a great deal of tin has been conserved in this one instance alone. Consider the case of two plants doing practically similar tinning operations. The one, A, for example, has been willing to co-operate in tin conservation and has been successful in utilizing an alternate material containing only 10 per cent tin.

The other, B, fails to look the problem straight in the face and has done nothing but insist that its work requires 100 per cent tin. Both these fictitious plants use 5000 pounds of tin normally per year. By utilizing the alloy composition, A gets enough metal to carry on for 10 years whereas B is finished at the end of one year, or, A has enough alloy material for 10 times the amount of work B could produce using pure tin. Lastly, the cost per pound to A is much less than that to B for the pure tin. Thus, in many cases of conservation, *not only the country benefits in large saving of tin but the consumer himself may make considerable savings.*

Lead-Alloy Coat: In the United States the War Production Board recently restricted the use of cadmium for rust-proofing and it is generally felt that zinc might be also eliminated eventually for this purpose. In view of this there has been tremendous interest in lead-alloy

THE SUB-BUSTER THAT WASN'T THERE

"We didn't have a chance. That murderous Nazi's fire whiplashed our open boat. Helpless, we ducked, and those who could, rowed on. Out in a ghostly glare, our ship went down.

"'By God, we'll make them pay for this,' said First Mate Stone, clenching his fist. Just then, a bullet got him in the throat.

"Your mind plays funny tricks at times like that. As those devils strafed us bow to stern, I seemed to see a DE Ship lunging in to pay them back a bit. Whenever I looked close, it wasn't there, and I kept wondering why."

* * *

Thousands of tiny parts make ships, planes, tanks, trucks, guns. In many cases, men's lives depend on *when* and *how* those parts are made.

Here, at R B & W, making millions of bolts and nuts every day, we have pledged ourselves to the realization that every part, even the smallest, counts. To special bolt-and-nut-making processes insuring flawless strength and accurate fit . . . we are adding, each one of us, the personal care and extra effort needed for world-wide victory.

Perhaps the workers in your plant would benefit from a clearer idea of what our soldiers and sailors are enduring. How important *each* one's part is . . . is the basic theme of a series of posters based on ads like this one—posters freely available to every "bits and parts" manufacturer. Write us. Russell, Burdsall & Ward Bolt and Nut Company, Port Chester, N. Y.

RB&W *Making strong the things that make America strong*

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COMPENSATE FOR MISALIGNMENT ON MOTOR AND TURBINE DRIVES

- *NO BACKLASH*
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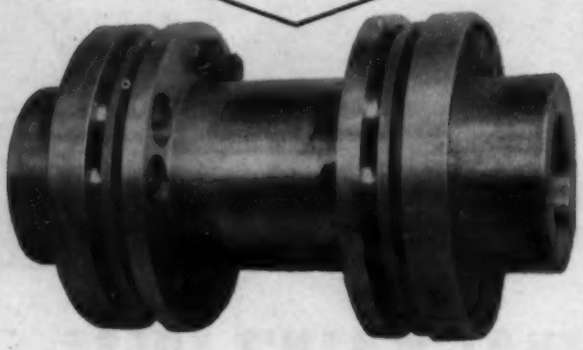

Designed especially for high speed, heavy duty motor and turbine service where high temperature tends to aggravate shaft misalignment, this Thomas Flexible Coupling eliminates end thrust and cross-pull on bearings. There are no wearing parts to cause backlash or require lubrication. Power is transmitted in straight tension by the flexible discs, which absorb vibration that causes fatigue and wear of your equipment. Send for a Thomas catalog showing couplings for all purposes.

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coating, which incidentally has several advantages over both cadmium and zinc coatings. Certain information has been published on the use of 2/98 tin-lead alloy for coating such things as sheets, fabricated articles, or copper.

This coating acts as a lubricant on sheets when drawn, is more ductile than common coatings, can readily be soldered with non-acid flux, can be painted immediately, is more economical because 60 pounds of tin-lead alloy will do the work of 100 pounds of zinc.

One of the large steel companies used hundreds of tons last year in place of terne metal containing 18 to 20 per cent tin. This particular firm believes in the ultimate use of sheets, coated with tin-lead alloy after the war instead of galvanized sheets. Many radio and transformer boxes and other sheet metal articles in mechanical transport and tanks plated with cadmium or zinc are difficult to solder and require acid flux. Fabricated articles of sheet metal are simultaneously coated and soldered by dipping into 2/98 tin-lead alloy in one operation.

Procedure for Lead Coating

The following process has been found to be very effective in producing a satisfactory lead coated article:

The steel, copper or brass sheets or other shapes should be thoroughly cleaned of all greases, dirt or foreign matter. The usual cleansers are trisodium phosphate solutions or vapor degreasers for oil, grease or drawing compound, and shot or sand blasting for scale or oxide. Any article cleaned in tri-sodium phosphate solution should be rinsed in plain water. The article is then dipped in a 5 per cent muriatic acid solution for pickling. A shot or sand blasted article may also be pickled but this is not absolutely necessary.

The length of time required in the pickling solution varies with the condition of the surface. A hard clean surface may require as long a time to pickle as an extremely dirty surface because some etching must be done so that the alloy will adhere. As the final appearance and the efficiency of the coating depends upon the conditions of the surface before it is coated, some experimenting will be necessary to determine the length of time required for pickling.

After pickling but while still wet, the article is placed in the D-W anhydrous flux bath. The flux should be kept at a temperature of about 343 degrees Cent.

At that temperature the flux is a black, viscous liquid and should completely cover the articles to be dipped.

The article should be held in flux until it is thoroughly heated to the temperature of the flux, the time depending upon the weight of the article to be covered. The article is then taken out of the flux and dipped into the 2/98 tin-lead alloy bath.

The article should remain in the lead alloy bath long enough to be thoroughly heated and should be withdrawn through a clean metal surface free from flux. This can be accomplished by hav-

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Dow supplies sand castings of Dowmetal Magnesium Alloys that meet the strictest Government specifications. These parts are fabricated in our own shops under strict metallurgical control and are an important feature of Dow's overall magnesium service, which ranges from ingots to finished products.

Dow is cooperating with producers of wartime products that call for magnesium parts. If your developments for peacetime markets include the use of magnesium, we suggest consultations with us. The advantages of our long experience with this weight-saving metal are yours to command.

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FROM INGOTS TO FINISHED PRODUCTS

INGOTS • CASTINGS • FORGINGS • SHEET • STRIP • PLATE • EXTRUSIONS

All Johnson Gas Appliances
DELIVERED IN TWO WEEKS

FURNACES
BURNERS
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No. 130-A
Firebox 7" high, 13" wide, 16½" long

HI-SPEED STEEL HEAT-TREATING FURNACE

You Can Also Get Any Part for Any Johnson Furnace or Burner Built Since 1901 . . . .

We have available patterns and parts for any Johnson unit ever built. A price sheet covering these parts will be furnished on request. If the Johnson Gas Appliances you now own need repairs we'll be glad to furnish them.

No. 101 Bench Furnace 2 burner—$13.50

No. 70 Hi-Speed Steel Heat-Treating Furnace $89.50

No. 34 Adjustable Pre-Heating Torch $40.00

No. 40 ABC Atmospheric Ring Burner $16.25

No. 120X Johnson Blower with G.E. Motor—$30.00

No. 130-A Heat-Treating Furnaces (Above)
4-burner for 1400 to 2000°F. — $295.00
6-burner for 1800 to 2400°F. — $325.00
Counterbalanced door opens upward for heat conservation when placing or removing parts being treated. Complete with large No. 120Y Johnson Blower.

No. 101 Johnson Bench Furnace, powerful, efficient and economical. For heating soldering coppers up to 12 pounds per pair.

No. 70 Hi-Speed Steel Heat-Treating Furnace Firebox 9" long, 7¾" wide, 5" high. Reaches 2400°F. in 30 minutes.

No. 34 Adjustable Pre-Heating Torch, with flame temperature of 2550°F. Produces hard flame, 3" dia. by 8" long, or long bushy flame.

No. 40 ABC Atmospheric Ring Burners. Powerful, durable, efficient. Can be used single, in pairs or in triple, each unit having two rows of raised gas ports.

No. 120 X Johnson Blower — for efficient delivery of constant air pressure. Cast iron housing, cast aluminum wheels, G. E. Motor. Also available in larger size.

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ing a partition across the surface of the solder bath to keep the flux on the side where the article enters, and passing the article under the partition when withdrawing. Any flux which appears on the surface while the article is in the bath can be pushed back before withdrawing the article. The article can then be quenched in paraffin oil at a temperature of about 100 degrees Cent. or in clear water, whichever gives the preferable surface.

Many fabricated articles of coated sheet metal are spot welded or hand soldered. If uncoated sheets are merely tacked here and there by spot welding or riveting, the coating and soldering will be done when dipped in the alloy which costs and solders at the same time.

Tinless Solders: The production of a solder containing no tin that could be used under the same conditions with the same technique as 50/50 tin—50 per cent lead solder, has been accomplished after a year of research. During this year of investigation, tests have been made on over 1000 alloys containing such elements as lead, tin, antimony, silver, cadmium, copper, bismuth, etc. Initially 20-per cent tin alloys were investigated and as the work progressed this percentage was reduced to 15, 10, 5, 2 and finally to 0.

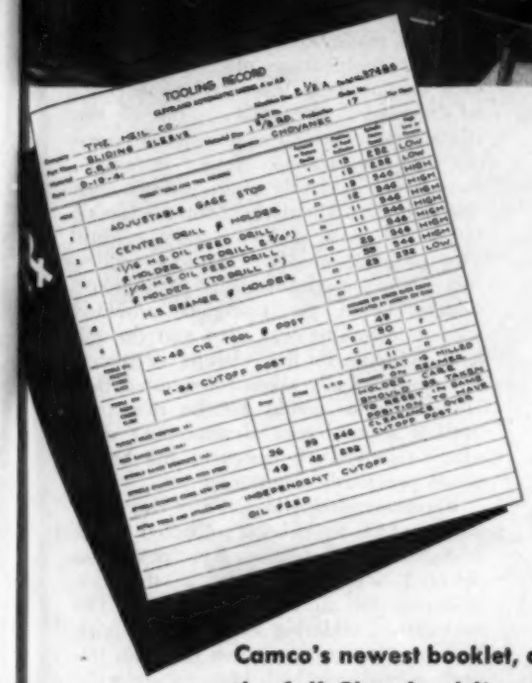
Melting Point: Generally speaking the feature that the soldering trades most desire in a solder is a melting point which will compare with the melting points they have been accustomed to in the lead-tin series of solders. This has been the greatest problem facing the silver-lead alloy solders. If a workman has grown accustomed to using 40/60 tin-lead solder over a period of years and is asked to use silver-lead solder in its place, he will likely consider it an impossibility because of the difference in working temperatures. Another disadvantage for some applications is that copper will anneal at the temperatures required to sweat the silver-lead.

An interesting operation with silver-lead solder is the soldering of cellular or honeycomb type radiator cores. The soldering of the core is carried out by dipping the assembled core into a bath of one of the new type fluxes and then into a bath of the solder alloy. In this type of core the copper strips are reinforced with brass strips. Therefore the annealing effect on the copper has no detrimental effect on the finished radiator. A perfect job is thus produced.

Also, the silver-lead alloy has given a very good account of itself in the can manufacturing industry. However, once again the operation is carried out using a bath of molten metal. *In view of these instances, which represents two of the most difficult soldering jobs, it is evident that silver-lead solder can be effectively used for all bath and dip soldering operations, provided the higher temperature required is not detrimental to the product and one of the new types of fluxes is employed.*

However, for general hand soldering

Prescription for Profitable Production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OIL FEED

Camco's newest booklet, describing the full Cleveland line of Single Spindle Automatics, has just been released. It contains information you will find interesting, whether you are production man or president.

COSTS very often get out of control on jobs which, for one reason or another, go into production and out . . . and back again. Set-up time, even on modern machines, can run up the bill, as every production man knows.

That's just another kind of a job on which Cleveland Universal Camming can make surprising savings. In the first place, *set-up time per operation* is reduced to a remarkable minimum by the simplicity and accessability of all controlling cams. Secondly, the speed with which Clevelands *complete several operations* is such that savings over other methods *commence with the first few pieces* finished and increase in proportion to the number produced.

Because of the accurate scaling and simple adjustments of the universal cams which control all operations, the set-up man can keep an exact record of every setting. This he uses as a sort of "prescription", if the job goes back on the machine, to re-tool with a great saving over the original set-up time.

That's the sort of saving that contributes to profitable production.

Remember, Clevelands Cut Costs

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CLEVELAND, OHIO

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Anything like this

IN YOUR PLANT?

This odd-looking thing is a specially fabricated tubular part used for the manufacture of an oil cooler.

It is made of seamless copper tube, 2" in diameter and has a wall thickness of .049". After the part is formed to the desired shape (specified by the customer), a special cast bronze fitting is brazed to one end.

Required for a definite purpose, it was designed by the user in collaboration with Wolverine tube-fabricating engineers. All specifications are being met and the job is in production.

If this piece reminds you of a similar problem of yours involving tube or tubular parts, call Wolverine Tube Division for consultation and quotation. We have hundreds of standard tools already on hand for making parts and assemblies similar to the part shown here, along with a wealth of experience in handling seamless tube.

Or if you prefer to make the part yourself, call on Wolverine anyway as a source for tube that will be uniformly high in quality and possess the right properties for fabricating. Also consult our engineers regarding types of tools, methods, and techniques. Their talents and services are yours for no cost.

DEFINITIONS

***Draw Bench*—a mechanical device containing a die through which metal is pulled to reduce its diameter. Tubes are thus made smaller and longer.**

• Our new address is Detroit 9, Mich.

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CALUMET AND HECLA CONSOLIDATED COPPER COMPANY
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applications, silver-lead left much to be desired. The next step was the study of solders resulting from the replacement of a certain amount of tin by bismuth. This series was investigated thoroughly and although the alloys contained 20 per cent tin, making them only economy solders, features were observed which were not present with the silver-lead solders.

These may be classified as: (1) low melting point; (2) increased fluidity (3) increased wetting power; (4) readily handled with hand iron.

One of the main drawbacks with these economy solders was "hot-shortness"; that is, the tendency to crack before the final state of equilibrium had been reached during the cooling down after soldering. This was only detrimental when tension had to be overcome by soldering. Nevertheless this fact limited their use.

Reproducing Tin Characteristics

As previously mentioned, the amount of tin in alternate solder alloys was reduced to zero as research continued. This was made possible by replacing the tin with combinations of other elements, such as antimony, silver, bismuth, etc., which tended to replace some of the characteristics which were normally present with the presence of tin. It is true, there were certainly shortcomings with this alloy, particularly "hot-shortness," but it did sweat and flow quite readily. The problem of "hot-shortness" which was evident in the majority of alternate solders could be tolerated provided special technique was used and the job held in shape by jigs, clamps, or plates. It was practically taken for granted that "hot-shortness" could not be overcome until a more recent development definitely removed all traces of the brittle range previously mentioned.

Recommended Alloys: From the many alloys which have been subjected to investigation, three classes have now been selected which will do a thorough soldering job in all applications. The majority of soldering jobs may be classified into two groups, those that can tolerate a relatively high temperature without any detrimental effect on the finished product; and those jobs where there is danger of undesirable results with higher temperatures. The third group is made up of the soldering of milk and cream cans and a range of general dairy equipment.

For the first group, silver-lead is recommended, to be used in conjunction with one of the new type fluxes previously mentioned. Silver-lead solder is very suitable for bath soldering operations and dipping pots. On this type of work the most satisfactory results are obtained with bath temperatures from 343 to 370 degrees Cent. Silver-lead solder may also be used in hand soldering operations, provided certain changes in technique are made.

For general hand soldering operations, where no changes in technique are necessary, a recently developed cadmium-lead alloy constitutes the most superior

Why doesn't somebody do something?

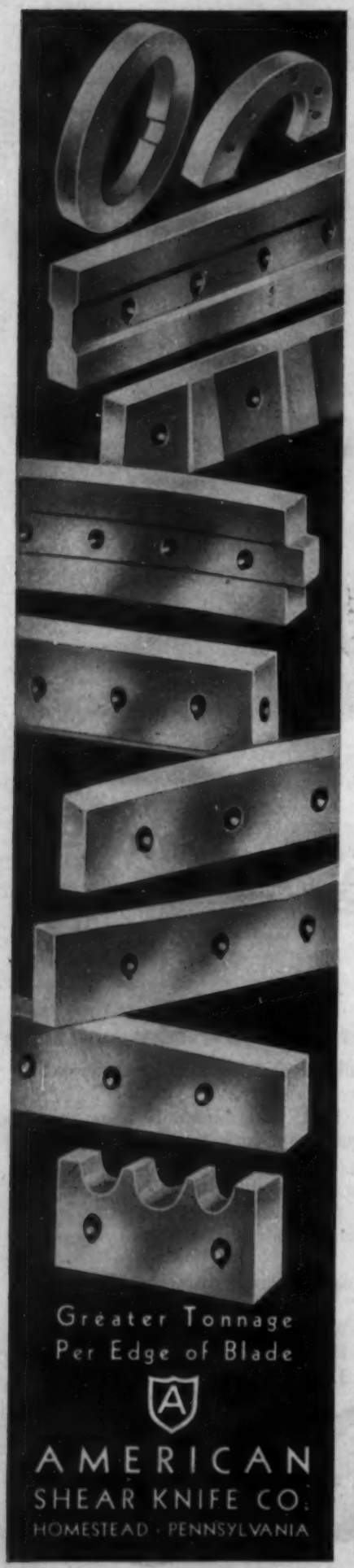
. . . or don't they know any better?

A sudden blaze calls for fast action . . . grab an extinguisher . . . hit the fire in a hurry.

Yet it takes "know how." Your men must know how to pick the *right* extinguisher, must know how to handle it. *Have you taught them these simple, important facts?*

Demonstrations do this teaching job best. Show your employees real fires, with real extinguishers in action. A series of well-run demonstrations may help save your plant, if fire breaks out.

So Walter Kidde & Company have prepared "How To Teach Fire-Fighting." It tells how to make these demonstrations most effective. Write for your plant's copy. It's free, of course. Walter Kidde & Company, Inc., 947 Main Street, Belleville, N. J.



alternate to 50/50 tin-lead solder. This material is recommended for all solder in bar and extruded forms with the exception of use in connection with the dairy trade.

For the soldering of milk and cream cans, and general dairy equipment, a tin-silver-lead alloy is recommended. Table II, showing the results of tests on certain alternate solders, gives some small indication of their possibilities. The alternate materials are here compared with 50/50 tin-lead solders.

Considering the three types of solders recommended, there is absolutely no tin present in two of them, and only 15 per cent tin in the third. It will, therefore, be seen that the general replacement of tin-lead solders by three solders of this type would make an important contribution to the conservation of tin.

AISI Revises Manual on Rolled Carbon-Steel Bars

A steel products manual on hot-rolled carbon-steel bars, section 8, was issued recently by the American Iron and Steel Institute, 350 Fifth avenue, New York. Revised as of June of this year, the publication is divided into four sections covering 72 pages.

The first deals with definitions and manufacturing practices; the second discusses the standard carbon steels, NE carbon steels, ranges and limits for non-standard steels, permissible variations for check analyses, methods of sampling and steels subject to physical tests. Manufacturing tolerances and a glossary of manufacturing terms are embodied in the third section, while the fourth part describes methods for marking packaging and loading, and the terms used in connection with these operations.

Baldwin-Southwark Makes Wood Toughness Tester

A new machine for testing the toughness of wood, developed recently by U. S. Forest Products Laboratory, is now being manufactured by Baldwin-Southwark Division, Baldwin Locomotive Works, Philadelphia. The machine, it is reported, discloses possible physical weakness in wood more accurately than by density and other physical property tests.

Substitute Drill Housing Aids Women Workers

Substitution of an all-plastic housing on its pneumatic drill not only reduced the weight of the unit but is eliminating fatigue among workers, Aro Equipment Corp., Bryan, O., reveals. Weighing 1 pound, 12 ounces, the tool is particularly suitable for women workers.

The drill operates at 2500 revolutions per minute, is 12 6¾ inches in overall length and accommodates 1/8, 3/16, 1/4 or 5/16-inch drills with Jacobs chuck.

BAD NEWS

for dead pans and sour pusses who complain that American industrial facilities are inadequate to handle rush war orders

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Industrial Equipment

(*Continued from Page* 106)

size of tip before a change is necessary. All coils whether for heating or hardening are shock resistant and water cooled. The unit embodies pre-set automatic controls, quenching auxiliaries, transformers, capacitors, "fool-proof" meters and pushbutton starting and stopping. Timers are placed on the front panel beneath the work pan flanking the meter board which is protected by a grill.

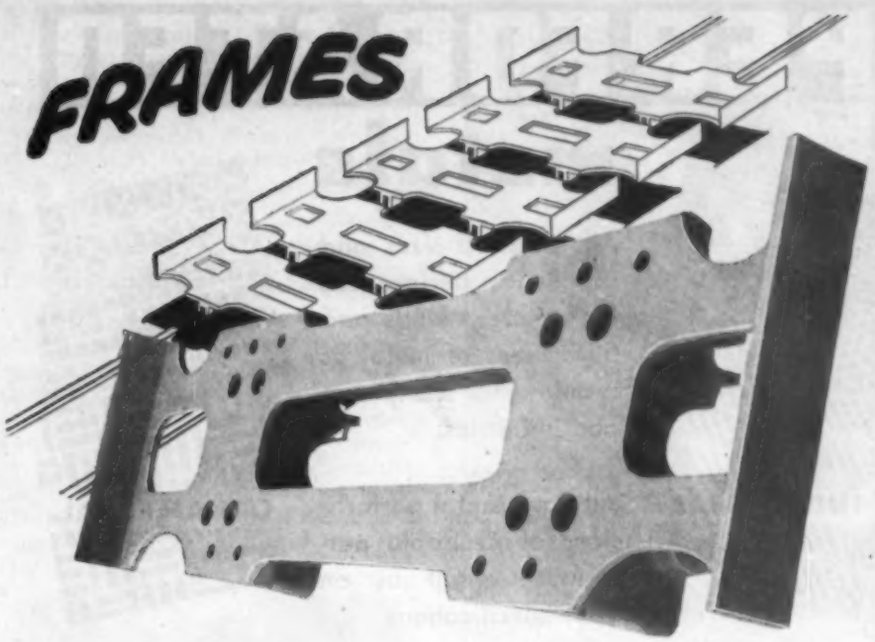
The machine occupies 48 x 31 inches of floor space and stands 51 inches high with the work pan set 35 inches above the floor. Only three connections are needed for its installation—two for water and one for power, 220/440 volts.

Test Chamber

American Coils Co., 27 Lexington street, Newark, N. J., has introduced an advanced model of a high-altitude test cabinet which is especially suitable for laboratory work. It consists of a vapor proof automatic mechanical refrigeration cabinet and an enclosed vacuum chamber with air space completely surrounding it. Above the vacuum chamber a coil of sufficient size is mounted to take care of complete pull down including mass load, heat leakage, etc., of the cabinet itself. In addition, the interior of the altitude chamber is equipped

with a coil and a forced air unit so that any heat dissipation from motors, etc., may be carried away in the refrigerating system rather than by heat transfer through the wall of the altitude chamber. An innovation in vacuum chamber design is the floating glass seal.

A heavy glass is mounted on the main refrigerator cabinet door, pivoted at the center and floating on spring bolts to maintain perfect alignment upon closing and to give freely under vacuum pressure. The seal to the vacuum chamber is made at the time the refrigerator door is latched. With the vacuum-sealed-glass-mounting principle the interior of the vacuum chamber can be dehydrated with the overhead coil and then sealed previous to pre-heating for obtaining low relative humidities. An outstanding advantage of this Amcoil unit, as it is called, is that any changes in test pro-



Castings like this form the frames of cars used to convey stainless steel into furnaces.

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For the Furnace Heat-Treating of Stainless Steel

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Because of the high furnace temperatures and the heavy loads, careful consideration had to be given the design of the frame castings and the uniformity of heat-resistant qualities throughout, for maximum life.

This is but another example of how the many years of alloy specialization, the modern equipment and expert foundry skill, make it possible at MICHIANA to meet many unusual demands that War production has brought about. The experience gained in solving new problems and meeting more diversified demands, will fit us to serve you still better after Victory is won.

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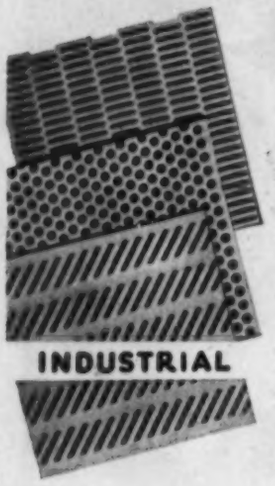

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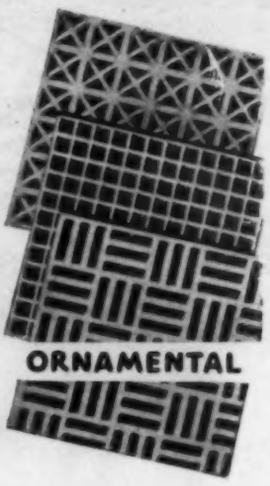

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Write for Bulletin WP 22

CULLEN-FRIESTEDT CO.
1308 S. Kilbourn Ave.
CHICAGO, ILLINOIS

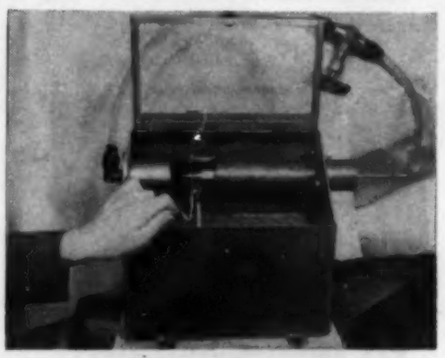
cedure, requiring holes, shafts, electrical leads, etc., affecting the construction of the vacuum chamber, can be made without disturbing the refrigeration equipment. The chamber can be removed intact, revamped or changed and then re-inserted in the cabinet without extensive repairs.

Exterior measurements of the unit are 72½ inches wide by 101½ inches high by 49 inches deep, including the stand. The height of the cabinet is 66½ inches. The interior (usable space) is 30 inches wide by 24 inches high by 18 inches deep. Temperature range is —70 degrees Cent. or —55 degrees Cent., to 70 degrees Cent. Pressure, from atmospheric to 60,000 feet.

Bearing Washer

A machine designed to clean and oil bearings individually without exposing them to room air or handling which would result in rusting from finger smudges is reported by Metal Washing Division, American Foundry Equipment Co., Mishawaka, Ind. It handles bearings of the type used in aircraft gyroscope instruments. Bearing races handled in the unit vary in size from ¼-inch outside diameter up to and including 1¼-inch outside diameter.

The washer consists of a solvent container, a fractional horsepower solvent



pump, a solvent filter and bearing adapters. If, on certain types of work, it is necessary to remove excess solvent from the cleaned bearings, an air-hose connection providing clean filtered air can be installed into the cleaning unit.

Operation of the unit is simple. Operator slips the bearing race to be cleaned over the adapter. Releasing a small plunger knob injects the bearing into the spray nozzle entrance. Solvent, under high pressure, is discharged from the nozzle and forced between the race and the balls of the bearing.

By twirling the operating knob all surfaces of the raceways can be exposed to the solvent. After the cleaning period, the solution is turned off and the bearing removed from the adapter. Eliminating manual handling after cleaning is a stripper mechanism which removes the bearings from the adapter, which then fall into a small chute and are discharged into a container or cellophane bag.

The solution is recirculated continu-

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A HILTON HOTEL
ROBERT P. WILLIFORD, *General Manager*

Direct Entrance from Grand Central Terminal

ously, passing through a filter to remove all minute dirt particles before reaching the nozzle. A nonbreakable plastic door allows the operator to view all operations.

Overall dimensions of the unit are only 17 x 19 x 15 inches—compact enough to be portable, yet designed for permanent location in a production line.

Feed Table

Disks, squares and other small parts can be faced speedier and more accurately by means of a new "in-out feed" table announced by Porter-Cable Machine Co., Syracuse, N. Y. The accessory, for use with belt grinders, consists of two tables, one at each side of the belt and both adjustable to the grit level. This enables the stock to be fed to and received from the belt on a perfectly

flat plane, avoiding the danger of nicking or grinding out of parallel.

An adjustable rail which holds the stock against the pressure of the belt also is provided with the unit. It can be set at the correct angle to control the amount of grinding, within micrometric tolerances. When attached to a wet-belt grinder, the device is dustless, prevents burned or abrased hands and can be used by inexperienced operators, after a minimum of instruction.

Rotary Tool Carrier

Production Machinery Development Co., 4845 St. Aubin avenue, Detroit, announces a new Matthew rotary tool carrier which completely overcomes the disadvantages of conventional milling attachments. It makes possible the finishing of a complete multiple job in one setting of the work on the table.

The tool carrying spindle of this unit is movable either in a fast, direct manner or by worm and wheel so that a job can be completed with a single setup. For straight line cutting, however, the cutter spindle can be locked solidly, the lock going around the full diameter of the outer body.

Work is first scribed out. After each operation, the cutter spindle is quickly returned to dead center, checked by means of a spindle lock. It is then reset for the next operation. The head of the carrier can be swiveled within 180 degrees. It can be fitted to any

12
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You'll throw away your paint pot and marking brush when you start using PAINTMARX. Here is a weather-proof "stick o'paint" that will not rub off, that can be used on metal, wood, and almost any other surface. Made in a big husky stick as easy to use as pencil on paper. Saves time and trouble when every minute counts. Insist on PAINTMARX from your dealer or distributor.

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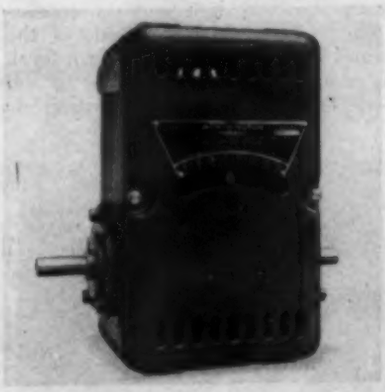
THE AMERICAN CRAYON COMPANY

make of horizontal milling machine. Entire spindle assembly can be locked at any point of the circle. The tool carrying spindle has two movements—direct lever for quick milling; worm and wheel for slow, heavy milling.

All-Speed Drive

Speeds of driven machines can be governed to conform with the experience of the operator by means of the new model A all-speed drive placed on the market by Worthington Pump & Machinery Corp., Harrison, N. J.

The drive, when used to find the peak production speed of any productive unit,



is instrumental in increasing production from 25 to 200 per cent. It features automatic positive belt tensioning and a speed ratio of 16:1. Of single-unit construction, the drive can be installed in any position.

It is applicable to any machine, either new or old.

Lift Truck

A new Hy-Lift truck which combines a self-loading feature with tiering as part of its functions and is useful for both transporting and tiering skidded material, is announced by the Baker Industrial Truck Division, Baker-Raulang Co., 2168 West Twenty-fifth street, Cleveland. A 4000-pound capacity unit, it is a companion truck of the type E-2 announced recently, STEEL, p. 120, Aug. 2, 1943.

The new handling unit, referred to as the type H-2, is built on a 66-inch wheelbase. Its overall height of 83 inches permits ready entrance into box cars and provides a maximum lift of 67 inches. Truck platform is 26½ inches wide by 54 inches long by 11 inches high in the low position.

The battery box of the unit provides space enough for additional battery capacity so that the truck may be operated continuously on longer shifts. It measures 32 x 39½ inches. An improved hydraulic-lift system provides positive control of hoisting and lowering. Control lever starts the pump motor and closes the valve forcing oil into the jack cylinder. Lowering is by gravity controlled by the same lever. A limit switch shuts off the pump motor at the

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For your convenience a miniature city of shops, in the Hotel.

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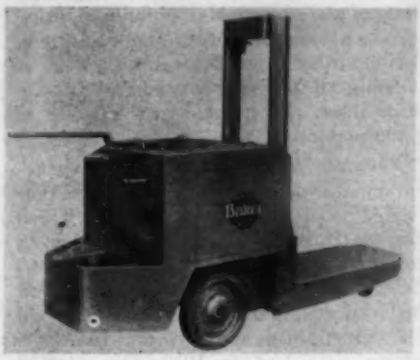
upper limit of platform travel with auxiliary safety through a relief valve. The platform travels vertically on ball-bearing rollers running in upright channel guides. Power is supplied by hy-



draulic jack and travel is compounded by sprockets and roller chains.

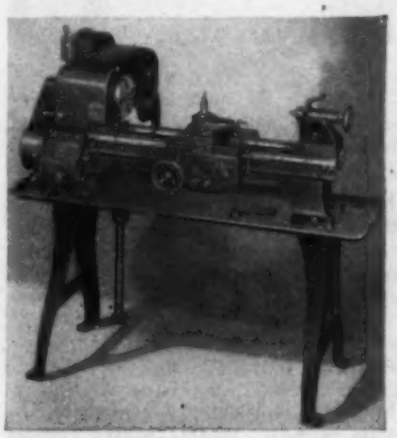
The travel brake which is located just below the control panel is adjusted by a single hex nut which is out in the open. The operator's guard is built integral with the frame, providing greater strength, additional protection and better appearance.

The right side forms a handy compartment for carrying towing chain, punch bar or other tools.

Gear Lathe

So "foolproof" in operation that even inexperienced workers quickly learn its operation, the new No. 820 quick-change gear lathe announced by Logan Engineering Co., 4901 Lawrence avenue, Chicago, is proving of special value where frequent changes in operating feeds must be made.

Box of the unit provides 48 threads and feeds in either direction to the carriage of the lathe. By simple adjustment of its two levers, screw threads



of 8 to 224 per inch are quickly available, and by changing the 24-tooth stud gear for the 48-tooth stud gear furnished with the lathe, additional threads from 4 to 7 per inch are available. Similarly, longitudinal power feeds from 0.0015 to 0.1000-inch per revolution on the spindle may be obtained. Power cross feeds are

Pour Babbitt *Safely!*

Babbitrite, the proven, time-tested babbitt retainer, eliminates costly, time-consuming blowouts, prevents injury from hot molten metal. Has strength of body to hold charge; sticks to the mold. Moisture-proof and moisture free, not affected by heat, will not harden. Comes ready-for-use, requires no mixing; can be re-used over 100 times.

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Arrows show Babbitrite used to fill and seal parting strips in casting intricate, light-metal chuck-jaws.

Babbitrite
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Strength you can rely on in "SAE 1035's heat treated"

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Cleveland Brand hexagon head cap screws made from SAE 1035 steel, *heat treated*, are worthy of your investigation. Much stronger than ordinary screws, they cost no more—in all popular sizes, fine or coarse thread.

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Look over your air operated equipment. You may find many places where reduced pressure will mean better performance, in addition to more efficient use of available air compressor capacity. With Hannifin pressure regulating valves, working pressure can be quickly and easily adjusted to the needs of each machine, and to different operations on the same machine.

Exclusive piston-type design, with long valve stem travel, provides large volumetric capacity and sensitive, accurate control of working pressures. Adjustment can be made over the entire working range from 150 lbs. down to provide any reduced operating pressure needed.

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—so shall you sleep—to awaken *refreshed* for a busy day in industrial Detroit. Those coveted innersprings (out for the duration) are still with us!

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600 OUTSIDE ROOMS ALL WITH PRIVATE BATH . . . SINGLE FROM $2.50 . . . DOUBLE FROM $4.00

Charles H. Lee, General Manager

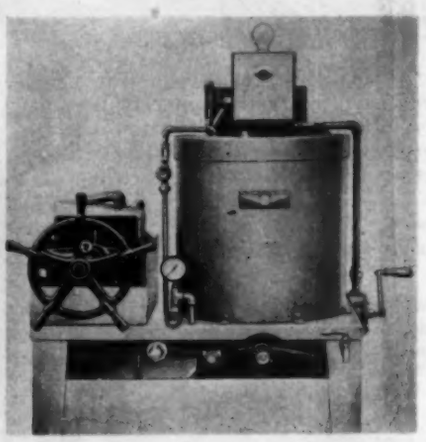
0.25 times the longitudinal feeds.

Another feature of the machine is its automatic apron which operates from a spline in the lead screw through a worm drive and friction clutch for both longitudinal and cross feeds. For cutting threads an additional longitudinal drive operates from half nuts on the lead screw. An important safety feature makes it impossible to engage both drives at the same time. Worm and gear operate in a bath of oil.

Features which assure required accuracy for precision work include "preloaded" ball bearing headstock which provides sustained spindle accuracy, a patented 3-point suspension of countershaft which eliminates vibration even at high speeds and a heavy, ribbed bed with precision ground Vee and flat ways. Swing over bed is 10½ inches. Bed length is 43⅛ inches.

Oil Reclaimer

Besides reclaiming lubricating oils of motor fleets, the new small capacity lubricating oil reclaimer recently introduced by Youngstown Miller Co., Sandusky, O., handles a limited quantity of waste lubricating oils drained from equipment used in plants. The unit has a capacity for purifying 8 gallons of dirty



oil in 70 to 90 minutes, and restores used oil to substantially the original values of fire, flash, viscosity, color, neutralization number, precipitation number.

Known as model A-8, the machine features a 2-stage filter press, is semi-automatic, operating under thermostatic control, and utilizes common refinery earths available on the open market.

Vertical Miller

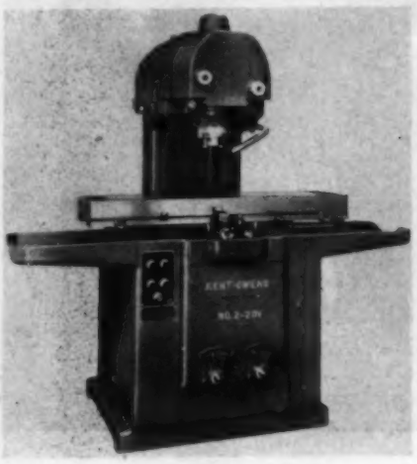
Kent-Owens Machine Co., Toledo, O., reports a new model 2-20V vertical miller, table of which can be fed or traversed rapidly in either direction, automatically shifted from rapid traverse to feed in either direction, and automatically reversed at both ends of the stroke. It also may be stopped automatically at any desired point in its travel.

The deep-section table travels in ways directly in the bed. It measures 42 x

12 inches wide and has a 20-inch travel with a fully automatic cycle. Three different column heights are available permitting minimum gap from table surface to spindle nose for maximum rigidity. The base machine has a maximum gap of 10 inches—maximum gaps of 12 or 14 inches also are available, each having 4-inch vertical quill adjustment.

Machine drive is simple and direct. It is mounted on anti-friction bearings and has automatic lubrication. Wide-face spline-mounted pick-off gears under a light aluminum cover on the head provide a wide range of spindle speeds. The gears run in oil and are easily removed for changing speeds. A medium range of 64 to 860 revolutions per minute is furnished as standard equipment.

An unusual feature of the machine



permits independent adjustment of the feed rate for opposite directions of table travel. This allows one operation to be done at one end of the table and an entirely different operation at the other end.

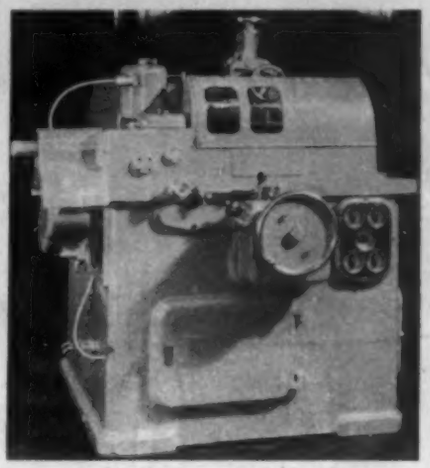
Each direction of table travel has a separate feed rate control dial which is adjusted independently of the other.

Thread Grinder

Either a conventional single-ribbed wheel or a multi-ribbed wheel may be employed in grinding threads with the thread grinder recently introduced by Sheffield Corp., Dayton, O. It offers improvements in efficiency from the standpoint of increased, accurate production and simplicity of operation and can be used for precision gage work or straight commercial production.

Single or multiple right or lefthand threads up to 60 per inch can be produced by the unit. Maximum length of work held between centers is 12 inches —maximum thread length ground is 8 inches, maximum diameter of work is 7 inches. Unit will grind threads to a maximum diameter of 3 inches. Any standard threads as well as special thread forms can be ground when the wheel is properly shaped.

Traverse grinding or plunge cutting also may be employed. In the latter operation a multi-ribbed wheel sufficiently wide to equal thread length is fed into the full depth of the thread, and the



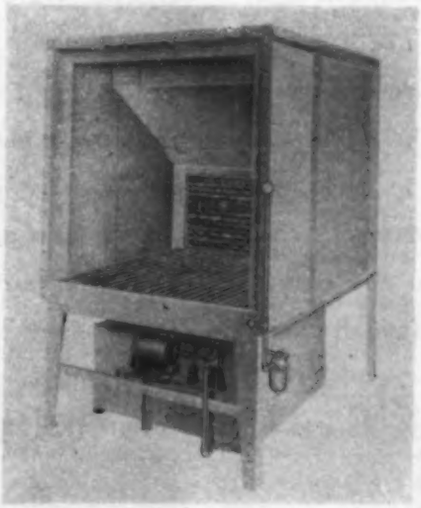
threaded increment is formed in one pass with the stock making 1 1/3 to 1½ turns. Multiple threads—two, three or four-start threads in most cases—may be ground in one pass.

An important feature of the unit is the multi-ribbed wheel crusher which is forced into the slowly rotating wheel to accurately form the wheel ribs. Another is an oil pressure switch, which prevents the wheel motor from starting until the oil pump builds up pressure to a predetermined point for continuous operation.

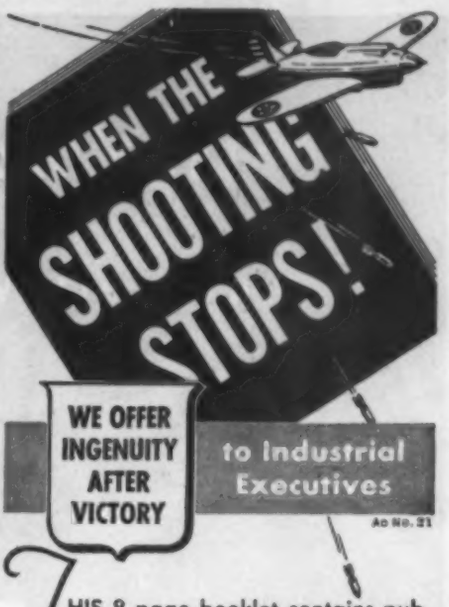
Certain models of the grinder are equipped for automatic cycle grinding. After the initial manual setup to produce the first piece, the operator is required only to load and unload it, throwing one lever to start the repeat cycle.

Spray-Degreasing Booth

Most important advantage of the new spray-degreasing booth announced lately by DeVilbiss Co., Toledo, O., is its ability to hold solvent loss to the barest minimum. Engineered for safe operation, even when hazardous materials of high



volatility and very low flash-point are used, the new unit also removes fumes more thoroughly and delivers a more forceful harder-driving solvent spray.



THIS 8-page booklet contains published articles representing five business-wise points of view, based on Spriesch activities.

Long before Pearl Harbor, Spriesch commenced making huge quantities of intricate bomb releasing mechanisms for use by Army and Navy Aircraft.

Manufacturing these complete assemblies, is adding greatly to a valuable specialized knowledge we will make available to others in industry.

Busy as we are, we have time to *think* on problems for Making or Bettering anything made from metal for fabrication in our plant or yours, After Victory! A Physicist-Mechanical Engineer of unusual ability consults with us on unusual problems.

The Spriesch "idea-to-manufacturing" service will be rendered along the following lines, in full or in any part:

1. **Ideas to blueprint, to metal; experimental or mass production.**
2. **Special Machines, Tools, Dies, Recommendations for Production.**
3. **Continuous recommendation for Product Improvement.**
4. **Recommendations on *what* to make for peacetime with present equipment.**

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Industrial Executives interested in knowing more about this unique service please write (on business letterhead) for booklet, "When the Shooting Stops!" Joseph J. Cheney, President.

Spriesch Established 1923
TOOL & MANUFACTURING CO.
Incorporated
22 HOWARD STREET • • • BUFFALO 6, N. Y.

The *Alrok Finish* for aluminum may relieve production bottlenecks

Alcoa-research developed the Alrok* finish for use on aluminum surfaces that are to be painted. It has proved completely adequate for many parts. It is quite possible that this chemically-applied finish can be satisfactorily substituted in many places where the more expensive, time-consuming electrolytic finishes are now specified.

Note the savings possible where the Alrok finish is employed: In one plant, two men finish 800 pounds of small parts per hour by the Alrok process, and 100% inspection is not necessary. It takes eight men to finish the same quantity of parts by the electrolytic process.

Bear in mind that, for the use made of these parts, both jobs are equally acceptable. Only one fourth the number of men, and no electrical generators, are required for the latter finishing job. The Alrok finish certainly deserves consideration for many parts on which the electrolytic finish is now specified.

There's an approved Government specification covering the Alrok finish for certain purposes. ALUMINUM COMPANY OF AMERICA, 2112 Gulf Bldg., Pittsburgh, Pa.

*Patented process

ALCOA ALUMINUM

Helpful Literature

1. Machine Tools

Delta Mfg. Co.—51-page illustrated industrial catalog No. 11 covers line of production machine tools and stresses advantages of adaptability, flexibility, portability, low cost and maintenance and reduced labor costs in operation. Included are drill presses, motors, cut-off machines, grinders, abrasive finishing machine, band saws, circular saws, jointers, scroll saws, shapers, lathes and miscellaneous accessories.

2. Induction Heating

Electric Arc, Inc.—36-page illustrated booklet discusses preheating, welding and normalizing by alternating current induction method. History of method is outlined. Its application is shown in pipe heating, shipyards, boiler and other shops. Booklet also explains materials required, temperature indication and electrical information.

3. Hydraulic Systems

Denison Engineering Co.—4-page illustrated bulletin No. DE-3 is entitled "HydrOILics helps Keep 'Em Flying". Bulletin shows how in air or on runway, modern airplanes depend upon efficiency of their hydraulic systems for swift, safe control. Test stand for quick and complete checkup of airplane's hydraulic system is shown. Three hydraulic presses are also described.

4. Heat Treating Fixtures

Driver-Harris Co.—15-page illustrated bulletin covers heat treating fixtures for pit type furnaces. Included are trays, quenching fixtures, wire mesh baskets, carburizing baskets, wire cloth trays, spacing frames, spiders, hanging fixtures and center posts. All fixtures are made of standard "Nichrome" and "Chromax" analyses and utilize castings, rods, sheet and wire.

5. Crane Maintenance

Harnischfeger Corp. — 32-page illustrated booklet No. C-28 is entitled, "P & H Crane Trouble Shooter." Information in question and answer form is presented to create clearer understanding between crane operators and service or maintenance crews. Common causes of failure are discussed so as to permit full cooperation between operating and maintenance departments.

6. Magnesium Furnaces

Fisher Furnace Co.—12-page illustrated bulletin No. 500 describes line of magnesium melting and alloying furnaces. Included are typical melting layout for sand casting production, permanent mold foundry layout and specifications for various sizes and designs of furnaces.

7. Liquid Carburizing Baths

A. F. Holden Co.—16-page illustrated booklet is descriptive of liquid carburizing baths for temperatures from 1450 to 1750 degrees Fahr. Seven distinct baths have been developed for different applications. Instructions for operating baths are outlined. Applications are listed.

8. Punch Press

Ferracute Machine Co.—4-page illustrated folder is descriptive of "Super Speed" punch press. With only one die it can produce 1000 blanks per minute. Operating principle is explained. Machine is best fed by strip stock taken directly from coil. It is equally adapted to contact short order work or very long runs. Specifications are listed.

9. Storage Batteries

Edison Storage Battery division, Thomas A. Edison, Inc.—20-page illustrated booklet for June, 1943 contains articles of interest to users of industrial storage batteries. Included is description of cyclone engine plant, yard charging system of Jacksonville Terminal, and application and maintenance of industrial trucks in pulp and paper mills.

10. Lead Plating

Harshaw Chemical Co.—8-page illustrated bulletin, "Lead Plating With Harshaw Fluoborate Lead Solution Concentrate," covers suggested uses, solution preparation, equipment, procedure and analyzing of solution. All phases dealing with application of electrodeposited lead for protective coatings are discussed.

11. Hard Facing Metal

Callite Tungsten Corp.—4-page illustrated bulletin No. 153 is entitled, "No-Wear Metal." Advantages and physical characteristics of this hard facing material are described. Details are given on method of application and typical uses.

12. Blast Control

Brown Instrument Co.—5-page technical bulletin No. BF-1 is entitled "Brown Control System for Hot Blast Temperatures." It is supplement to bulletin 27-7 which deals with control of hot blast temperatures with single mixing valve.

13. Radial Drills

Fosdick Machine Tool Co.—24-page illustrated catalog No. 31 is descriptive of "Fosdick Economax" hydraulic radials which are built in sizes from 3 to 8 feet. Features of machine include hydraulic variable rapid traverse to head, hydraulic column clamp, hydraulic arm clamp and hydraulic safety nut. Full specifications are given for all machines.

14. Nickel Alloys

International Nickel Co.—20-page catalog C contains brief descriptions of contents of selected publications covering industrial applications, mechanical properties, physical properties, working instructions, guides and monographs on nickel and its alloys. Reply cards for obtaining various publications are incorporated in this bulletin.

15. Gage Blocks

Webber Gage Co.—16-page illustrated catalog and price list on "Webber Micro Accurate Gages" discusses manufacture of precision gage blocks which are available in complete sets with tolerances of either 0.000008 or 0.000004 inches. Set may be comprised of 84, 43 or 38 blocks. Individual standard size blocks are also listed. Inspection service of company is described and facts outlined on care of gage blocks.

16. Engineering Service

A. W. Hecker—14-page illustrated booklet is entitled, "Tooling For Speed and Accuracy". Facilities and services of company are summarized. Outlines four types of engineering service: plant layout starting from factory site or designing new line-ups for existing facilities; processing; designing tools, jigs, fixtures and special machinery; and making time studies of machining operations to find most efficient method.

17. Moisture Control

Harry W. Dietert Co.—4-page illustrated folder describes "Moisture Teller" for rapid and accurate drying of wide range of materials. It is particularly adapted for drying granular, fibrous and crystalline substances. Instrument dries by forcing large volume of moderately heated air through test sample. Specifications are included for five different models.

18. Tool Conservation

Greenfield Tap & Die Corp.—17-page illustrated booklet is concerned with importance of tool crib in tool conservation. Important points to keep in mind in locating tool crib and tool crib layout are outlined. Explains possible methods of identifying tools in bins and need for accounting system. Various types of bins are shown.

19. Dust Collectors

Peters-Dalton, Inc.—4-page illustrated folder describes "Hydro-Whirl" orifice type dust collector. Collector is specially suited for processing magnesium. Only mechanical moving parts are fan and motor. Sludge removal compartment is at side of each model. Seven different models are illustrated.

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Company_____

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20. Refrigerated Welding

Frostrode Products—4-page illustrated bulletin No. F-43 explains "Frostrods" process of refrigerated welding. Describes design and operating features of system as whole as well as various components of system. Includes refrigerator units, permanent welding electrodes with replaceable tips and adapters to convert any standard resistance welder to use of refrigerated welding process.

21. Synthetic Rubber

B. F. Goodrich Co.—8-page illustrated revised catalog section No. 8000 discusses properties of "Ameripol D" including its resistance to various substances which are enemies of natural rubber, hardness, tensile trength, elongation, weight, color, odor, taste, elasticity and permanent set, resistance to tear, abrasion, flexing, oils, solvents and heat.

22. Atmosphere Indicator

Claud S. Gordon Co.—4-page illustrated "Gordon Service Bulletin, July 1943" describes "Weaver" furnace atmosphere indicator which is adaptable to all types of atmosphere heat treating furnaces. Continuous gas analysis instrument permits maintenance of any desired furnace atmosphere.

23. Machine Tools

Ex-Cell-O Corp.—10-page illustrated folder is descriptive of line of machine tools, power operating units and aircraft parts. Chart shows price inflation, national income and business activity in the United States from 1775 through 1942. Progress of twenty years of machine tool production is tabulated. Supplementary table explains what war does to cost-of-living dollar.

24. Boiler Water Conditioning

Elgin Softener Corp.—15-page illustrated bulletin No. 504 is treatise on boiler water conditioning. It explains types of impurities found in boiler feedwater, how they accumulate, causes of boiler scale and corrosion, and how to prevent these troubles. Describes "Deconcentrator" which separates suspended impurities from boiler water while boilers are in operation.

25. Electrode Chart

Metal & Thermit Corp.—20 x 32 inch "Murex" electrode chart is designed for hanging on wall and provides guide for selection of correct electrodes for welding all types of materials. In addition to procedure data, guidance is given for obtaining maximum utilization of welding electrodes.

26. Brazed Joint Design

Handy & Harman—4-page illustrated bulletin is entitled, "Design for Fast, Reliable, Low-cost Metal Joining With Low Temperature Brazing." Advantages of "Sil-Fos" and "Easy-Flo" brazing methods are described. Also covered are types of joints and factors in joint design. Typical applications of low temperature brazing in war jobs are shown.

27. Open Steel Flooring

Kerlow Steel Flooring Co.—31-page illustrated catalog No. MC 43 is entitled "Industry's Magic Carpet". Catalog shows advantages, proportions and construction of many different designs of open steel flooring. Includes standard safe load table, sketch of typical floor plan and complete dimensions of various types of flooring to assist purchaser in selection and layout for individual requirements.

28. Rotary Files

Diebold, Inc.—7-page illustrated booklet explains how "Cardineer" rotary files speed control of personnel and payroll records. Various cards are shown for recording payroll, attendance, history of employment, seniority rights, share the ride data, morale promotion and employe's suggestions.

29. Heat Fans

Garden City Fan Co.—12-page illustrated bulletin No. 370 shows construction and outlines performance characteristics of line of fans for handling gases at temperatures ranging from 300 to 1600 degrees Fahr. Bulletin contains conversion chart for varying densities of air or gases, as well as capacity tables for various sizes of fans.

30. Prefabricated Construction

Stran-Steel division, Great Lakes Steel Corp.—17-page illustrated booklet covers products company is building for military forces, both here and abroad. Products are huts and utility building featuring "Arch-Rib" construction. Complete building package to meet military requirements for either tropics or snowbound north is supplied. Erection of buildings requires only screwdrivers, wrenches and hammers.

31. Industrial Insulations

Johns-Manville—52-page illustrated booklet No. GI-6A contains information and recommendations on high and low temperature insulations for industrial needs from minus 400 to 2500 degrees Fahr. Data are given on refractory products and castables, roofs, friction materials, electrical insulation and conduit, water line pipe, vent pipe, stacks, packings and gaskets.

32. Electrical Motors

General Electric Co.—40-page illustrated bulletin No. GED-1017 is concerned with motor fitness requirements. It discusses how to get most service out of old and new motors, switching motors from one job to another and equipping old machines with new motors. Bulletin also covers selection and application of motors.

33. Flow Rate Meter

Fischer Porter Co.—Two illustrated catalog sections Nos. 98-Y and 99-Z are entitled "The Theory of the Rotameter" and "Rotameter Capacities and Correction Factors". Included is discussion of history and development of area type flow meters. Text, diagrams and illustrations explain advantages of these meters.

34. Dump Trailers

Easton Car & Construction Co.—Illustrated bulletin No. 178 is descriptive of models 806 and 807 rocker dump trailers designed for trackless handling of all types of dry bulk materials where loading is done by hand. Wheels are rubber tired or equipped with all metal or composition treads. Body is dumped and righted with minimum effort because of precise balance of rockers.

35. Fabricated Piping

Flori Pipe Co.—64-page illustrated booklet is entitled, "If It's Piping Contact Flori". Booklet covers various ways in which piping can be used and lists present market prices for all kinds and sizes of fabricated piping.

36. Welding Alloys

Eutectic Welding Alloys Co.—"Welding Chart of Castolin Eutectic Welding Alloys" lists various low temperature alloys for joining cast iron, steel, copper brass, bronze, aluminum, die castings and other materials. Physical properties and procedure information are tabulated in readily usable form.

37. Diesel Engines

Fairbanks, Morse & Co.—23-page illustrated bulletin No. 3000A is concerned with role of diesel engines in modern industry. History of company is traced. Manufacturing technique and service facilities are outlined. Discusses marine diesel line and diesels for stationary service.

38. Rings

Dresser Mfg. Co.—25-page illustrated booklet is entitled "Rings for War". It describes company's service and facilities for producing rings of any size and many shapes made of ferrous or non-ferrous materials. Examples of several types are shown. Method of testing and checking rings is outlined.

39. Atmosphere Furnaces

Hevi-Duty Electric Co.—12-page illustrated bulletin No. HD-643 discusses protective combusted atmospheres in "Hevi-Duty" furnaces and describes curtain type furnace, gas preparation unit and gas cracking unit.

40. High Speed Steel

Firth-Sterling Steel Co.—4-page illustrated folder describes "Circle C" high speed steel. This cobalt-tungsten steel is dense and tough, has unusual red hardness value and is particularly adapted for high production. Steel is suitable for lathe, planer, shaper, cut-off, slotting, milling, forming, drilling and boring tools.

41. Industrial Ovens

Despatch Oven Co.—12-page illustrated bulletin No. 51 presents information on finish baking and drying ovens for synthetic enamels, lacquers, varnishes, paints, enamels and japans. Typical installations are shown. Scientific heat distribution assures uniform finishes. Bulletin shows how selection of proper oven saves floor space handling cost.

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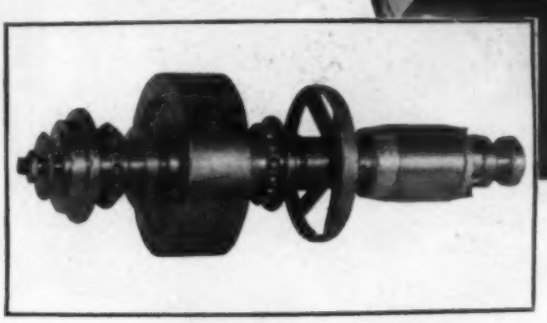
THE MILWAUKEE FACE MILL GRINDER GIVES YOU ALL THREE!

1 UNUSUAL RIGIDITY

2 REDUCED SHARPENING TIME

3 ACCURACY TO WITHIN .0002 PER INCH



The three-bearing spindle rotates at 3,400 R.P.M. and carries a heavy flywheel, the inertia of which when in motion successfully keeps the abrasive wheel up to grinding speed. Sharpening time has been considerably reduced as a result.

THE basic design of the Milwaukee Face Mill Grinder embodies strength, precision, and capacity. It is capable of sharpening Tungsten Carbide Cutters ranging from 3" to 16" in diameter — grinds the blades to within .0002 per inch.

Set-ups are quickly made with graduated dials, facilitating adjustments. Other controls are handily located for simplified operation.

OTHER IMPORTANT FEATURES:

1. Jeweled bearing dial indicator for accurate checking.
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5. No adapters necessary.
6. Spindle has No. 50 National Standard Taper.
7. Blower system at slight extra cost.

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The Center Scope is an optical locating machine shop tool, constructed for use on any machine from jig borers to bench drills. No technical knowledge or training is needed to use it. It is a necessary production tool — necessary today because you are interested in saving time — tomorrow, because you will be interested in saving cost.

Built in various models; variable and rotating Center Scope priced at $97.00, with taper shank, $125.00; Special Center Scope, $125.00 — Edge Block, $23.00 additional.

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Milwaukee Face Mill Grinder
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Milwaukee Midgetmill
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Milwaukee Speedmill

STRENGTH TO TAKE IT and COME BACK FOR MORE

One to ten against the Japs . . . one to four against the Nazis! Speaks well for the crews and planes of the American Air Force. But, aircraft steel must be good to take it as well as dish it out day after day. And our losses compared with those of the enemy argue well for American steel. Scores of manufacturers specify our aircraft quality steel for that inbuilt stamina which gives a plane strength to take it and come back for more.

We are happy to have a part in the manufacture of quality steel for America's all-out war effort. Aircraft quality alloy and carbon steel is produced in sheets in a wide range of sizes and thicknesses to meet specifications AN-QQ-S-685 (X-4130). AN-QQ-S-686 (X-4135). AN-QQ-S-756 (X-4340). AN-S-11 (SAE 1020-1025). AN-S-12 (NE-8630). AN-S-22 (NE-8635). We will be glad to send more information on request.

THE NEWPORT ROLLING MILL CO.
NEWPORT KENTUCKY
DIVISION OF THE ANDREWS STEEL CO.

★ ★ ★ *The Andrews Steel Company produces a limited range of aircraft quality alloy plates* ★ ★ ★

Steel Needs Unaffected By Collapse of Italy

Heavy movement of munitions to Mediterranean area continues. . . Sheet and plate order backlogs are becoming further extended. . . Lend-Lease tonnage gains

DEMAND
Greater in plates and sheets.

PRODUCTION
At record on tonnage basis.

PRICES
Unchanged.

ITALY'S unconditional surrender is expected to have little effect on the overall scope of the war production program.

With Germany indicating it intends to fight for Italy it is generally agreed that as long as Nazi resistance continues in that country there can be no letdown in the demand for munitions and equipment from United Nations' forces in that battle sector.

It is clear that whatever changes in specifications may result from the Italian collapse they will be offset by requirements in other directions, and by the intensification of production in certain lines to make it possible for Allied forces to take fullest possible advantage of the Italian capitulation.

In addition, raw materials, including steel, will be needed on a large scale to supply whatever Italian manufacturing facilities can be utilized by the Allies. Consequently there seems little prospect the military situation today permits of any view in the direction of easier war steel demand.

Italy's collapse has again focused attention of the scrap trade on possibility of battlefield scrap being retained for use by the Italian steel industry. In recent weeks there has been an increasing amount of this scrap shipped to this country, although still not in heavy volume. Reversal of this trend is possible, but much depends upon condition of Italy's steel plants by the time they fall into Allied hands. A substantial amount of battlefield scrap has been salvaged on this side and this may be a factor in the continued movement of scrap to this country, unless salvaging facilities and organizations be set up abroad. Italy's steel plants also will have to be supplied with coal if they are to be utilized.

• • •

Lend-lease steel shipments from the East coast are considerably better than in many months. Present two weeks' supply stored on the eastern seaboard for lend-lease shipments is considered too low an inventory. It is understood about 350,000 tons are being shipped monthly under lend-lease, and about half of this total is being exported to countries purchasing steel outright.

War Production Board is urging consumers of open-hearth alloy steel to use more electric furnace steel and thus conserve open hearth capacity as a temporary expedient to relieve pressure on carbon steel. Expanded facilities have eased the electric steel situation, moreover mill quotas on open-hearth alloy steel are being restricted.

Distribution of vital sheet orders continues complicated by the plate program. Substantial tonnage of sheets has not been allotted to the mills because priorities given the Maritime Commission for plates are taking most of the available rolling time on continuous mills, and the shortage of suitable semifinished material limits tonnage on non-integrated sheet mills. Army orders for drum stock, ammunition boxes and similar vital equipment are among those now awaiting placement.

Steel plate allocation numbers for first and second quarters are coming out more freely, with the result most producers have no room on their schedules before late February. High octane gasoline refinery tonnage is increasing again, with some being placed for fourth quarter under directives. Mill interests say this is the first important directive tonnage received since the inauguration of CMP.

August plate shipments were off moderately to 1,061,000 tons, comparing with 1,089,000 in the preceding month and 1,097,866 in corresponding 1942 period.

• • •

Freight car builders are not clear as to where all the steel is coming from for the construction of 9645 domestic cars allocated for the fourth quarter. Mills are booked over the remainder of the year, generally speaking, and so far they have received allotment numbers for only some of the steel needed for these cars. Domestic freight car awards in August of 4422 units, were the largest since January when 8365 were placed. Total awards for the first eight months of 16,992, compares with 24,030 in like period last year and 103,902 in corresponding months of 1941.

Iron ore shipments during August established the second consecutive monthly record, although unfavorable weather towards the close of the period prevented the total from exceeding the 14,000,000 gross tons earlier predicted. Reflecting completion of three additional Maritime Commission vessels on the Great Lakes this month, the ore movement in September should remain at current high level despite the shorter month. August ore shipments of 13,976,770 gross tons, brought the season's total to 52,359,474, or 13.6 per cent below the 60,593,534 tons shipped by vessel during the corresponding 1942 period.

Average composite prices of steel and iron products show no change from the level of past months, controlled by Office of Price Administration ceilings. Finished steel average composite is $56.73, semifinished steel $36, steelmaking pig iron $23.05 and steelmaking scrap $19.17.

COMPOSITE MARKET AVERAGES

	Sept. 11	Sept. 4	Aug. 28	One Month Ago Aug., 1943	Three Months Ago June, 1943	One Year Ago Sept., 1942	Five Years Ago Sept., 1938
Finished Steel	$56.73	$56.73	$56.73	$56.73	$56.73	$56.73	$58.00
Semifinished Steel	36.00	36.00	36.00	36.00	36.00	36.00	36.60
Steelmaking Pig Iron	23.05	23.05	23.05	23.05	23.05	23.05	19.05
Steelmaking Scrap	19.17	19.17	19.17	19.17	19.17	19.17	14.35

Finished Steel Composite:—Average of industry-wide prices on sheets, strip, bars, plates, shapes, wire, nails, tin plate, standard and line pipe. Semifinished Steel Composite:—Average of industry-wide prices on billets, slabs, sheet bars, skelp and wire rods. Steelmaking Pig Iron Composite:—Average of basic pig iron prices at Bethlehem, Birmingham, Buffalo, Chicago, Cleveland, Neville Island, Granite City and Youngstown. Steelworks Scrap Composite:—Average of No. 1 heavy melting steel prices at Pittsburgh, Chicago and eastern Pennsylvania.

COMPARISON OF PRICES

Representative Market Figures for Current Week; Average for Last Month, Three Months and One Year Ago

Finished Material	Sept. 11, 1943	Aug., 1943	June, 1943	Sept., 1942
Steel bars, Pittsburgh	2.15c	2.15c	2.15c	2.15c
Steel bars, Chicago	2.15	2.15	2.15	2.15
Steel bars, Philadelphia	2.47	2.47	2.48	2.49
Shapes, Pittsburgh	2.10	2.10	2.10	2.10
Shapes, Philadelphia	2.215	2.22	2.22	2.22
Shapes, Chicago	2.10	2.10	2.10	2.10
Plates, Pittsburgh	2.10	2.10	2.10	2.10
Plates, Philadelphia	2.15	2.15	2.15	2.15
Plates, Chicago	2.10	2.10	2.10	2.10
Sheets, hot-rolled, Pittsburgh	2.10	2.10	2.10	2.10
Sheets, cold-rolled, Pittsburgh	3.05	3.05	3.05	3.05
Sheets, No. 24 galv., Pittsburgh	3.50	3.50	3.50	3.50
Sheets, hot-rolled, Gary	2.10	2.10	2.10	2.10
Sheets, cold-rolled, Gary	3.05	3.05	3.05	3.05
Sheets, No. 24 galv., Gary	3.50	3.50	3.50	3.50
Bright bess., basic wire, Pittsburgh	2.60	2.60	2.60	2.60
Tin plate, per base box, Pittsburgh	$5.00	$5.00	$5.00	$5.00
Wire nails, Pittsburgh	2.55	2.55	2.55	2.55
Semifinished Material				
Sheet bars, Pittsburgh, Chicago	$34.00	$34.00	$34.00	$34.00
Slabs, Pittsburgh, Chicago	34.00	34.00	34.00	34.00
Rerolling billets, Pittsburgh	34.00	34.00	34.00	34.00
Wire rods, No. 5 to ½-inch, Pitts.	2.00	2.00	2.00	2.00

Pig Iron	Sept. 11, 1943	Aug., 1943	June, 1943	Sept., 1942
Bessemer, del. Pittsburgh	$25.19	$25.19	$25.19	$25.19
Basic, Valley	23.50	23.50	23.50	23.50
Basic, eastern, del. Philadelphia	25.34	25.34	25.36	25.39
No. 2 fdry., del. Pitts., N.&S. Sides	24.69	24.69	24.69	24.69
No. 2 foundry, Chicago	24.00	24.00	24.00	24.00
Southern No. 2, Birmingham	20.38	20.38	20.38	20.38
Southern No. 2, del. Cincinnati	24.30	24.30	24.30	24.06
No. 2 fdry., del. Phila.	25.84	25.89	25.89	25.89
Malleable, Valley	24.00	24.00	24.00	24.00
Malleable, Chicago	24.00	24.00	24.00	24.00
Lake Sup., charcoal, del. Chicago	37.34	37.34	31.54	31.54
Gray forge, del. Pittsburgh	24.19	24.19	24.19	24.19
Ferromanganese, del. Pittsburgh	140.33	140.33	140.33	140.65
Scrap				
Heavy melting steel, Pittsburgh	$20.00	$20.00	$20.00	$20.00
Heavy melt. steel, No. 2, E. Pa.	18.75	18.75	18.75	18.75
Heavy melting, steel, Chicago	18.75	18.75	18.75	18.75
Rails for rolling, Chicago	22.25	22.25	22.25	22.25
No. 1 cast, Chicago	20.00	20.00	20.00	20.00
Coke				
Connellsville, furnace, ovens	$6.50	$6.50	$6.40	$6.00
Connellsville, foundry, ovens	7.75	7.75	7.75	7.25
Chicago, by-product fdry., del.	12.25	12.25	12.25	12.25

STEEL, IRON, RAW MATERIAL, FUEL AND METALS PRICES

Following are maximum prices established by OPA Schedule No. 6 issued April 16, 1941, revised June 20, 1941 and Feb. 4, 1942. The schedule covers all iron or steel ingots, all semifinished iron or steel products, all finished hot-rolled, cold rolled iron or steel products and any iron or steel product which is further finished by galvanizing, plating, coating, drawing, extruding, etc., although only principal established basing points for selected products are named specifically. Seconds and off-grade products also are covered. Exceptions applying to individual companies are noted in the table.

Semifinished Steel

Gross ton basis except wire rods, skelp.

Carbon Steel Ingots: F.o.b. mill base, rerolling qual., stand. analysis, $31.00.
(Empire Sheet & Tin Plate Co., Mansfield, O., may quote carbon steel ingots at $33 gross ton, f.o.b. mill. Kaiser Co. Inc. $43, f.o.b. Pacific ports.)

Alloy Steel Ingots: Pittsburgh, Chicago, Buffalo, Bethlehem, Canton, Massillon; uncropped, $45.

Rerolling Billets, Blooms, Slabs: Pittsburgh, Chicago, Gary, Cleveland, Buffalo, Sparrows Point, Birmingham, Youngstown, $34.00; Detroit, del. $36; Duluth (bil.) $36.
(Andrews Steel Co., carbon slabs $41; Continental Steel Corp., billets $34, Kokomo, to Acme Steel Co.; Northwestern Steel & Wire Co. $41, Sterling, Ill.; Laclede Steel Co. $34, Alton or Madison, Ill.; Wheeling Steel Corp. $36 base, billets for lend-lease, $34, Portsmouth, O., on slabs on WPB directives.)

Forging Quality Blooms, Slabs, Billets: Pittsburgh, Chicago, Gary, Cleveland, Buffalo, Birmingham, Youngstown, $40. Detroit, del. $42; Duluth, billets only, $42.
(Andrews Steel Co. may quote carbon forging billets $50 gross ton at established basing points; Follansbee Steel Corp., $49.50 f.o.b. Toronto, O.

Open Hearth Shell Steel: Pittsburgh, Chicago, Gary, Cleveland, Buffalo, Youngstown, Birmingham, base 1000 tons one size and section: 3-12 in., $52; 12-18 in., excl., $54.00; 18 in. and over, $56. Add $2.00 del. Detroit; $3.00 del. Eastern Mich.

Alloy Billets, Slabs, Blooms: Pittsburgh, Chicago, Buffalo, Bethlehem, Canton, Massillon, $54; del. Detroit $56, Eastern Mich. $57.

Sheet Bars: Pittsburgh, Chicago, Cleveland, Buffalo, Canton, Sparrows Point, Youngstown, $34. (Wheeling Steel Corp. $37 on lend-lease sheet bars, $38 Portsmouth, O., on WPB directives; Empire Sheet & Tin Plate Co., Mansfield, O., carbon sheet bars, $39, f.o.b. mill.)

Skelp: Pittsburgh, Chicago, Sparrows Pt., Youngstown, Coatesville, lb., 1.90c.

Wire Rods: Pittsburgh, Chicago, Cleveland, Birmingham, Galveston, No. 5—9/32 in., inclusive, per 100 lbs., $2. Do., over 9/32—47/64-in., incl., $2.15.
Worcester add $0.10; Pacific Ports $0.50.

Bars

Hot-Rolled Carbon Bars and Bar-Size Shapes under 3": Pittsburgh, Chicago, Gary, Cleveland, Buffalo, Birmingham, base 20 tons one size, 2.15c; Duluth, base 2.25c; Mahoning Valley 2.22½c; Detroit, del. 2.25c; Eastern Mich. 2.30c; New York del. 2.49c; Phila. del. 2.47c; Gulf Ports, dock 2.52c; Pac. ports, dock 2.80c. (Calumet Steel Division, Borg Warner Corp., may quote 2.35c, Chicago base, on bars produced in its 8-inch mill.)

Rail Steel Bars: Same prices as for hot-rolled carbon bars except base is 5 tons.
(Sweet's Steel Co., Williamsport, Pa., may quote rail steel merchant bars 2.33c f.o.b. mill.)

Hot-Rolled Alloy Bars: Pittsburgh, Chicago, Canton, Massillon, Buffalo, Bethlehem, base 20 tons one size, 2.70c; Detroit, del., 2.80c.
(Texas Steel Co. may use Chicago base price as maximum f.o.b. Fort Worth, Tex., price on sales outside Texas, Oklahoma.)

AISI Series	(*Basic O-H)	AISI Series	(*Basic O-H)
1300	$0.10	4100 (.15-.25 Mo)	0.55
		(.20-.30 Mo)	0.60
2300	1.70	4340	1.70
2500	2.55	4600	1.20
3000	0.50	4800	2.15
3100	0.70	5100	0.35
3200	1.35	5130 or 5152	0.45
3400	3.20	6120 or 6152	0.95
4000	0.45-0.55	6145 or 6150	1.20

*Add 0.25 for acid open-hearth; 0.50 electric.

Cold-Finished Carbon Bars: Pittsburgh, Chicago, Gary, Cleveland, Buffalo, base 20,000-39,999 lbs., 2.65c; Detroit 2.70c; Toledo 2.80c. (Keystone Drawn Steel Co. may sell outside its usual market area on Proc. Div., Treasury Dept. contracts at 2.65c, Spring City, Pa., plus freight on hot-rolled bars from Pittsburgh to Spring City. New England Drawn Steel Co. may sell outside New England on WPB directives at 2.65c, Mansfield, Mass., plus freight on hot-rolled bars from Buffalo to Mansfield.)

Cold-Finished Alloy Bars: Pittsburgh, Chicago, Gary, Cleveland, Buffalo, base 3.35c; Detroit, del. 3.45c; Eastern Mich 3.50c.

Reinforcing Bars (New Billet): Pittsburgh, Chicago, Gary, Cleveland, Birmingham, Sparrows Point, Buffalo, Youngstown, base 2.15c; Detroit del. 2.25c; Eastern Mich. and Toledo 2.30c; Gulf ports, dock 2.50c; Pacific ports, dock 2.55c.

Reinforcing Bars (Rail Steel): Pittsburgh, Chicago, Gary, Cleveland, Birmingham, Youngstown, Buffalo base 2.15c; Detroit, del. 2.25c; Eastern Mich. and Toledo 2.30c; Gulf ports, dock 2.50c.
(Sweet's Steel Co., Williamsport, Pa., may quote rail steel reinforcing bars 2.33c, f.o.b. mill.)

Iron Bars: Single refined, Pitts. 4.40c, double refined 5.40c; Pittsburgh, staybolt, 5.75c; Terre Haute, common, 2.15c.

Sheets, Strip

Hot-Rolled Sheets: Pittsburgh, Chicago, Gary, Cleveland, Birmingham, Buffalo, Youngstown, Sparrows Pt., Middletown, base 2.10c; Granite City, base 2.20c; Detroit del. 2.20c; Eastern Mich. 2.25c; Phila. del. 2.27c; New York del., 2.34c; Pacific ports 2.65c.
(Andrews Steel Co. may quote hot-rolled sheets for shipment to Detroit and the Detroit area on the Middletown, O. base.)

Cold-Rolled Sheets: Pittsburgh, Chicago, Cleveland, Gary, Buffalo, Youngstown, Middletown, base, 3.05c; Granite City, base 3.15c; Detroit del. 3.15c; Eastern Mich. 3.20c; New York del. 3.38c; Phila. del. 3.37c; Pacific ports 3.70c.

Galvanized Sheets, No. 24: Pittsburgh, Chicago, Gary, Birmingham, Buffalo, Youngstown, Sparrows Point, Middletown, base 3.50c; Granite City, base 3.60c; New York del. 3.74c; Phila. del. 3.67c; Pacific ports 4.05c.
(Andrews Steel Co. may quote galvanized sheets 3.75c at established basing points.)

Corrugated Galv. Sheets: Pittsburgh, Chicago, Gary, Birmingham, 29 gage, per square 3.31c.

Culvert Sheets: Pittsburgh, Chicago, Gary, Birmingham, 16 gage, not corrugated, copper alloy 3.60c; Granite City 3.70c; Pacific Ports 4.25c; copper iron 3.90c, pure iron 3.95c; zinc-coated, hot-dipped, heat-treated, No. 24, Pittsburgh 4.25c.

Enameling Sheets: Pittsburgh, Chicago, Gary, Cleveland, Youngstown, Middletown, 10 gage, base 2.75c; Granite City, base 2.85c; Detroit del. 2.85c; Eastern Mich. 2.90c; Pacific ports 3.40c.

Pittsburgh, Chicago, Gary, Cleveland, Youngstown, Middletown, 20 gage, base 3.35c; Granite City, base 3.45c; Detroit del. 3.45c; Eastern Mich. 3.50c; Pacific ports 4.00c.

Electrical Sheets, No. 24:

	Pittsburgh Base	Pacific Ports	Granite City
Field grade	3.20c	3.95c	3.30c
Armature	3.55c	4.30c	3.65c
Electrical	4.05c	4.80c	4.15c
Motor	4.95c	5.70c	5.05c
Dynamo	5.65c	6.40c	5.75c
Transformer			
72	6.15c	6.90c	....
65	7.15c	7.90c	....
58	7.65c	8.40c	....
52	8.45c	9.20c	....
U.S.S., R.C. Grade	10.10c	....	....

Hot-Rolled Strip: Pittsburgh, Chicago, Gary, Cleveland, Birmingham, Youngstown, Middletown, base, 1 ton and over, 12 inches wide and less 2.10c;.. Detroit del. 2.20c; Eastern Mich. 2.25c; Pacific ports 2.75c. (Joslyn Mfg. Co. may quote 2.30c, Chicago base.)

Cold Rolled Strip: Pittsburgh, Cleveland, Youngstown, 0.25 carbon and less 2.80c; Chicago, base 2.90c; Detroit, del. 2.90c; Eastern Mich. 2.95c; Worcester base 3.00c.

Commodity C. R. Strip: Pittsburgh, Cleveland, Youngstown, base 3 tons and over, 2.95c; Chicago 3.05c; Detroit del. 3.45c; Eastern Mich. 3.50c; Worcester base 3.35c.

Cold-Finished Spring Steel: Pittsburgh, Cleveland bases, add 20c for Worcester; .26-.50 Carb., 2.80c; .51-.75 Carb., 4.30c; .76-1.00 Carb., 6.15c; over 1.00 Carb.. 8.35c.

Tin, Terne Plate

Tin Plate: Pittsburgh, Chicago, Gary, 100-lb. base box, $5.00; Granite City $5.10.

Electrolytic Tin Plate: Pittsburgh, Gary, 100-lb. base box, 0.50 lb. tin, $4.50; 0.75 lb. tin $4.65.

Tin Mill Black Plate, Pittsburgh, Chicago, Gary, base 29 gage and lighter, 3.05c; Granite City, 3.15c; Pacific ports, boxed 4.05c.

Long Ternes: Pittsburgh, Chicago, Gary, No. 24 unassorted 3.80c; Pacific ports 4.55c.

Manufacturing Ternes: (Special Coated) Pittsburgh, Chicago, Gary, 100-base box $4.30; Granite City $4.40.

Roofing Ternes: Pittsburgh base per package 112 sheets; 20 x 28 in., coating I.C., 8-lb. $12.00; 15-lb. $14.00; 20-lb. $15.00; 25-lb. $16.00; 30-lb. $17.25; 40-lb. $19.50.

Plates

Carbon Steel Plates: Pittsburgh, Chicago, Gary, Cleveland, Birmingham, Youngstown, Sparrows Point, Coatesville, Claymont, 2.10c; New York, del., 2.29c; Phila., del., 2.15c; St. Louis, 2.34c; Boston, del., 2.42-67c; Pacific ports, 2.65c; Gulf Ports, 2.45c.

(Granite City Steel Co. may quote carbon plates 2.35c, f.o.b. mill. Central Iron & Steel Co. 2.20c, f.o.b. basing points.)

Floor Plates: Pittsburgh, Chicago, 3.35c; Pacific ports, 4.00c.

Open-Hearth Alloy Plates: Pittsburgh, Chicago, Coatesville, 3.50c; Gulf ports 3.95c; Pacific ports 4.15c.

Wrought Iron Plates: Pittsburgh, 3.80c

Shapes

Structural shapes: Pittsburgh, Chicago, Gary, Birmingham, Buffalo, Bethlehem, 2.10c; New York, del., 2.27c; Phila., del., 2.215c; Pacific ports, 2.75c.

(Phoenix Iron Co., Phoenixville, Pa. may quote carbon steel shapes at 2.35c at established basing points and 2.50c, Phoenixville, for export.)

Steel Sheet Piling: Pittsburgh, Chicago, Buffalo, 2.40c.

Wire Products, Nails

Wire: Pittsburgh, Chicago, Cleveland, Birmingham (except spring wire) to manufacturers in carloads (add $2 for Worcester, $1 for Duluth):

Bright basic, bessemer wire	2.60c
Spring wire	3.20c

Wire Products to the Trade:

Standard and Cement-coated wire nails, and staples, 100-lb. keg, Pittsburgh, Chicago, Birmingham, Cleveland, Duluth $2.55; Pacific ports	3.05c
Annealed fence wire, 100-lb., Pittsburgh, Chicago, Cleveland	3.05c
Galvanized fence wire, 100 lb., Pittsburgh, Chicago, Cleveland	3.40c
Woven fence, 15½ gage and heavier, per base column	.67

Barbed wire, 80-rod spool, Pittsburgh, Chicago, Cleveland, Birmingham, column 70; twisted barbless wire, column 70.

Pipe, Tubes

Welded Pipe: Base price in carloads, threaded and coupled, to consumers about $200 per net ton. Base discounts on steel pipe Pittsburgh and Lorain, O.; Gary, Ind. 2 points less on lap weld, 1 point less on butt weld. Pittsburgh base only on wrought iron pipe.

Butt Weld

In.	Steel Blk.	Steel Galv.	In.	Iron Blk.	Iron Galv.
⅛	56	33	⅛	24	3½
¼ & ⅜	59	40½	¼	30	10
½	63½	51	1-1¼	34	16
¾	66½	55	1½	38	18½
1-3	68½	57½	2	37½	18

Lap Weld

In.	Steel Blk.	Steel Galv.	In.	Iron Blk.	Iron Galv.
2	61	49½	1¼	23	3½
2½-3	64	52½	1½	28½	10
3½-6	66	54½	2	30½	12
7-8	65	52½	2½, 3½	31½	14½
9-10	64½	52	4	33½	18
11-12	63½	51	4½-8	32½	17
			9-12	28½	12

Boiler Tubes: Net base prices per 100 feet, f.o.b. Pittsburgh in carload lots, minimum wall, cut lengths 4 to 24 feet, inclusive.

O. D. Sizes	B.W.G.	—Seamless— Hot Rolled	Cold Drawn	—Lap Weld— Steel	Charcoal Iron
1"	13	$ 7.62	$ 9.01	....	....
1¼"	13	9.26	10.67	....	....
1½"	13	10.23	11.72	$ 9.72	$23.71
1¾"	13	11.64	13.42	11.06	22.93
2"	13	13.04	15.03	12.38	19.35
2¼"	13	14.54	16.76	13.79	21.63
2¼"	12	16.01	18.45	15.16	....
2½"	12	17.54	20.21	16.56	26.57
2¾"	12	18.59	21.42	17.54	29.00
3"	12	19.50	22.48	18.35	31.38
3½"	11	24.63	28.37	23.15	39.81
4"	10	30.54	35.20	28.66	49.90
4½"	10	37.35	43.04	35.22	....
5"	9	46.87	54.01	44.25	73.93
6"	7	71.96	82.93	68.14	....

Rails, Supplies

Standard rails, over 60-lb., f.o.b. mill, gross ton, $40.00.

Light rails (billet), Pittsburgh, Chicago, Birmingham, gross ton, $40.00.

*Relaying rails, 35 lbs. and over, f.o.b. railroad and basing points, $28-$30.

Supplies: Track bolts, 4.75c; do. heat treated, 5.00c. Tie plates, $43 gross ton, base.

*Fixed by OPA Schedule No. 46, Dec. 15, 1941.

Tool Steels

Tool Steels: Pittsburgh, Bethlehem, Syracuse, base, cents per lb.: Reg. carbon 14.00c; extra carbon 18.00c; special carbon 22.00c; oil-hardening 24.00c; high car.-chr. 43.00c.

High Speed Tool Steels:

Tung.	Chr.	Van.	Moly.	Pitts. base. per lb.
18.00	4	1	...	67.00c
1.5	4	1	8.5	54.00c
	4	2	8	54.00c
5.50	4	1.50	4	57.50c
5.50	4.50	4	4.50	70.00c

Stainless Steels

Base, Cents per lb.—f.o.b. Pittsburgh

Type	Bars	Plates	Sheets	H. R. Strip	C. R. Strip
CHROMIUM NICKEL STEEL					
302	24.00c	27.00c	34.00c	21.50c	28.00c
303	26.00	29.00	36.00	27.00	33.00
304	25.00	29.00	36.00	23.50	30.00
308	29.00	34.00	41.00	28.50	35.00
309	36.00	40.00	47.00	37.00	47.00
310	49.00	52.00	53.00	48.75	56.00
312	36.00	40.00	49.00	....	....
*316	40.00	44.00	48.00	40.00	48.00
†321	29.00	34.00	41.00	29.25	38.00
‡347	33.00	38.00	45.00	33.00	42.00
431	19.00	22.00	29.00	17.50	22.50
STRAIGHT CHROMIUM STEEL					
403	21.50	24.50	29.50	21.25	27.00
**410	18.50	21.50	26.50	17.00	22.00
416	19.00	22.00	27.00	18.25	23.50
††420	24.00	28.50	33.50	23.75	36.50
430	19.00	22.00	29.00	17.50	22.50
‡‡430F	19.50	22.50	29.50	18.75	24.50
440A	24.00	28.50	33.50	23.75	36.50
442	22.50	25.50	32.50	24.00	32.00
443	22.50	25.50	32.50	24.00	32.00
446	27.50	30.50	36.50	35.00	52.00
501	8.00	12.00	15.75	12.00	17.00
502	9.00	13.00	16.75	13.00	18.00
STAINLESS CLAD STEEL (20%)					
304	....	§§18.00	19.00	....	....

*With 2-3% moly. †With titanium. ‡With columbium. ** Plus machining agent. ††High carbon. ‡‡Free machining. §§Includes annealing and pickling.

Basing Point Prices are (1) those announced by U. S. Steel Corp. subsidiaries for first quarter of 1941 or in effect April 16, 1941 at designated basing points or (2) those prices announced or customarily quoted by other producers at the same designated points. Base prices under (2) cannot exceed those under (1) except to the extent prevailing in third quarter of 1940.

Extras mean additions or deductions from base prices in effect April 16, 1941.

Delivered prices applying to Detroit, Eastern Michigan, Gulf and Pacific Coast points are deemed basing points except in the case of the latter two areas when water transportation is not available, in which case nearest basing point price, plus all-rail freight may be charged.

Domestic Ceiling prices are the aggregate of (1) governing basing point price, (2) extras and (3) transportation charges to the point of delivery as customarily computed. **Governing basing point** is basing point nearest the consumer providing the lowest delivered price. **Emergency basing point** is the basing point at or near the place of production or origin.

Seconds, maximum prices: flat-rolled rejects 75% of prime prices; wasters 75%, waste-wasters 65%, except plates, which take waster prices; tin plate $2.80 per 100 lbs.; terne plate $2.25; semifinished 85% of primes; other grades limited to new material ceilings.

Export ceiling prices may be either the aggregate of (1) governing basing point or emergency basing point (2) export extras (3) export transportation charges provided they are the f.a.s. seaboard quotations of the U. S. Steel Export Co. on April 16, 1941.

Bolts, Nuts

F.o.b. Pittsburgh, Cleveland, Birmingham, Chicago. Discounts for carloads additional 5%, full containers, add 10%.

Carriage and Machine

½ x 6 and smaller	65½ off
Do., ⅝ and ⅞ x 6-in. and shorter	63½ off
Do., ¾ to 1 x 6-in. and shorter	61 off
1⅛ and larger, all lengths	59 off
All diameters, over 6-in. long	59 off
Tire bolts	50 off
Step bolts	56 off
Plow bolts	65 off

Stove Bolts

In packages with nuts separate 71-10 off; with nuts attached 71 off; bulk 80 off on 15,000 of 3-inch and shorter, or 5000 over 3-in.

Nuts

	U.S.S.	S.A.E.
Semifinished hex.	62	64
⅛-inch and less	59	60
⅛-1-inch	57	58
1⅛-1½-inch	56	..
1⅝ and larger		

Hexagon Cap Screws

Upset 1-in., smaller	64 off
Milled 1-in., smaller	60 off

Square Head Set Screws

Upset, 1-in., smaller	71 off
Headless, ¼-in., larger	60 off
No. 10, smaller	70 off

Piling

Pittsburgh, Chicago, Buffalo 2.40c

Rivets, Washers

F.o.b. Pittsburgh, Cleveland, Chicago, Birmingham

Structural	3.75c
½-inch and under	65-5 off
Wrought washers, Pittsburgh, Chicago, Philadelphia, to jobbers and large nut, bolt manufacturers l.c.l.	$2.75-3.00 off

Metallurgical Coke

Price Per Net Ton

Beehive Ovens

Connellsville, furnace	*6.50
Connellsville, foundry	7.50- 8.00
Connellsville prem. fdry.	7.75- 8.10
New River, foundry	8.50- 8.75
Wise county, foundry	7.25- 7.75
Wise county, furnace	6.75- 7.25

By-Product Foundry

Kearny, N. J., ovens	12.15
Chicago, outside delivered	11.50
Chicago, delivered	12.25
Terre Haute, delivered	12.00
Milwaukee, ovens	12.25
New England, delivered	13.75
St. Louis, delivered	†12.25
Birmingham, ovens	8.50
Indianapolis, delivered	12.00
Cincinnati, delivered	11.75
Cleveland, delivered	12.30
Buffalo, delivered	12.50
Detroit, delivered	12.25
Philadelphia, delivered	12.38

*Operators of hand-drawn ovens using trucked coal may charge $7.00, effective Feb. 3, 1943.
†$12.75 from other than Ala., Mo., Tenn.

Coke By-Products

Spot, gal., freight allowed east of Omaha

Pure and 90% benzol	15.00c
Toluol, two degree	28.00c
Solvent naphtha	27.00c
Industrial xylol	27.00c
Per lb. f.o.b. works	
Phenol (car lots, returnable drums)	12.50c
Do., less than car lots	13.25c
Do. tank cars	11.50c
Eastern Plants, per lb.	
Naphthalene flakes, balls, bbls., to jobbers	8.00c
Per ton, bulk, f.o.b. port	
Sulphate of ammonia	$29.20

Pig Iron

Prices (in gross tons) are maximums fixed by OPA Price Schedule No. 10, effective June 10, 1941. Exceptions indicated in footnotes. Allocation regulations from WPB Order M-17, expiring Dec. 31, 1942. Base prices bold face, delivered light face. Federal tax on freight charges, effective Dec. 1, 1942, not included in following prices.

	No. 2 Foundry	Basic*	Bessemer	Malleable
Bethlehem, Pa., base	$25.00	$24.50	$26.00	$25.50
Newark, N. J., del.	26.53	26.03	27.53	27.03
Brooklyn, N. Y., del.	27.50	.....	.....	28.00
Birdsboro, Pa., base	25.00	24.50	26.00	25.50
Birmingham, base	‡20.38	†19.00	.....	.....
Baltimore, del.	25.61	.....	.....	.....
Boston, del.	25.12	.....	.....	.....
Chicago, del.	24.22	.....	.....	.....
Cincinnati, del.	24.06	22.68	.....	.....
Cleveland, del.	24.12	23.24	.....	.....
Newark, N. J., del.	26.15	.....	.....	.....
Philadelphia, del	25.46	24.58	.....	.....
St. Louis, del.	24.12	23.24	.....	.....
Buffalo, base	24.00	23.00	25.00	24.50
Boston, del.	25.50	25.00	26.50	26.00
Rochester, del.	25.53	.....	26.53	26.03
Syracuse, del.	26.08	.....	27.08	26.58
Chicago, base	24.00	23.50	24.50	24.00
Milwaukee, del.	25.10	24.60	25.60	25.10
Muskegon, Mich., del.	27.19	.....	.....	27.19
Cleveland, base	24.00	23.50	24.50	24.00
Akron, Canton, O., del.	25.39	24.89	25.89	25.39
Detroit, base	24.00	23.50	24.50	24.00
Saginaw, Mich., del.	26.31	25.81	26.81	26.31
Duluth, base	24.50	24.00	25.00	24.50
St. Paul, del.	26.63	26.13	27.13	26.63
Erie, Pa., base	24.00	23.50	25.00	24.50
Everett, Mass., base	25.00	24.50	26.00	25.50
Boston, del.	25.50	25.00	26.50	26.00
Granite City, Ill., base	24.00	23.50	24.50	24.00
St. Louis, del.	24.50	24.00	.....	24.50
Hamilton, O., base	24.00	23.50	.....	24.00
Cincinnati, del.	24.44	24.61	.....	25.11
Neville Island, Pa., base	24.00	23.50	24.50	24.00
‡Pittsburgh, del. No. & So. sides	24.69	24.19	25.19	24.69
Provo, Utah, base	22.00	21.50	.....	.....
Sharpsville, Pa., base	24.00	23.50	24.50	24.00
Sparrows Point, Md., base	25.00	24.50	.....	.....
Baltimore, del.	25.99	.....	.....	.....
Steelton, Pa., base	.....	24.50	.....	25.50
Swedeland, Pa., base	25.00	24.50	26.00	25.50
Philadelphia, del.	25.84	25.34	.....	26.34
Toledo, O., base	24.00	23.50	24.50	24.00
Mansfield, O., del.	25.94	25.44	25.44	25.94
Youngstown, O., base	24.00	23.50	24.50	24.00

*Basic silicon grade (1.75-2.25%), add 50c for each 0.25%; 50c deduction under 1.75%. †For phosphorus 0.70 and over deduct 38c. ‡Over 0.70 phos. ‡For McKees Rocks, Pa., add .55 to Neville Island base; Lawrenceville, Homestead, McKeesport, Ambridge, Monaca, Aliquippa, .84; Monessen, Monongahela City .97 (water); Oakmont, Verona 1.11; Brackenridge 1.24.

Note: Add 50 cents per ton for each 0.50% manganese over 1.00%.

High Silicon, Silvery

6.00-6.50 per cent (base)	$29.50		
6.51-7.00	$30.50	9.01- 9.50	$35.50
7.01-7.50	31.50	9.51-10.00	36.50
7.51-8.00	32.50	10.01-10.50	37.50
8.01-8.50	33.50	10.51-11.00	38.50
8.51-9.00	34.50	11.01-11.50	39.50

F.o.b. Jackson county, O., per gross ton, Buffalo base prices are $1.25 higher. Prices subject to additional charge of 50 cents a ton for each 0.50% manganese in excess of 1.00%.

Bessemer Ferrosilicon

Prices same as for high silicon silvery iron, plus $1 per gross ton. (For higher silicon irons a differential over and above the price of base grades is charged as well as for the hard chilling iron, Nos. 5 and 6.)

Charcoal Pig Iron

Northern

Lake Superior Furn.	$34.00
Chicago, del.	37.34

Southern

Semi-cold blast, high phos., f.o.b. furnace, Lyles, Tenn.	$28.50
Semi-cold blast, low phos., f.o.b. furnace, Lyles, Tenn.	33.00

Gray Forge

Neville Island, Pa.	$23.50
Valley, base	23.50

Low Phosphorus

Basing points: Birdsboro and Steelton, Pa., and Buffalo, N. Y., $29.50 base; $30.74, delivered, Philadelphia.

Switching Charges: Basing point prices are subject to an additional charge for delivery within the switching limits of the respective districts.

Silicon Differentials: Basing point prices are subject to an additional charge not to exceed 50 cents a ton for each 0.25 silicon in excess of base grade (1.75 to 2.25%).

Phosphorus Differential: Basing point prices are subject to a reduction of 38 cents a ton for phosphorus content of 0.70% and over.

Manganese Differentials: Basing point prices subject to an additional charge not to exceed 50 cents a ton for each 0.50% manganese content in excess of 1.0%.

Ceiling Prices are the aggregate of (1) governing basing point (2) differentials (3) transportation charges from governing basing point to point of delivery as customarily computed. Governing basing point is the one resulting in the lowest delivered price for the consumer.

Exceptions to Ceiling Prices: Pittsburgh Coke & Iron Co. (Sharpsville, Pa. furnace only) and Struthers Iron & Steel Co. may charge 50 cents a ton in excess of basing point prices for No. 2 Foundry, Basic Bessemer and Malleable. Mystic Iron Works, Everett, Mass., may exceed basing point prices by $2 per ton, effective May 20, 1943. Chester, Pa., furnace of Pittsburgh Coke & Iron Co. may exceed basing point prices by $2.25 per ton, effective July 27, 1942.

Refractories

Per 1000 f.o.b. Works, Net Prices

Fire Clay Brick	
Super Quality	
Pa., Mo., Ky.	$64.60
First Quality	
Pa., Ill., Md., Mo., Ky.	51.30
Alabama, Georgia	51.30
New Jersey	56.00
Ohio	43.00
Second Quality	
Pa., Ill., Md., Mo., Ky.	46.55
Alabama, Georgia	38.00
New Jersey	49.00
Ohio	36.00
Malleable Bung Brick	
All bases	$59.85
Silica Brick	
Pennsylvania	$51.30
Joliet, E. Chicago	58.90
Birmingham, Ala.	51.30
Ladle Brick (Pa., O., W. Va., Mo.)	
Dry press	$31.00
Wire cut	29.00
Magnesite	
Domestic dead-burned grains, net ton f.o.b. Chewelah, Wash., net ton, bulk	22.00
net ton, bags	26.00
Basic Brick	
Net ton, f.o.b. Baltimore, Plymouth Meeting, Chester, Pa.	
Chrome brick	$54.00
Chem. bonded chrome	54.00
Magnesite brick	76.00
Chem. bonded magnesite	65.00

Fluorspar

Metallurgical grade, f.o.b. Ill., Ky., net ton, carloads, CaF_2 content, 70% or more, $33; 65 but less than 70%, $32; 60 but less than 65% $31; less than 60% $30. (After Aug. 29 base price any grade $30.)

Ferroalloy Prices

Ferromanganese (standard): 78-82% c.l. gross ton, duty paid, eastern, central and western zones, $135; add $6 for packed c.l., $10 for ton, $10.50 less-ton; f.o.b. cars, New Orleans, $1.70 for each 1%, or fraction contained manganese over 82% or under 78%; delivered Pittsburgh, $140.33. Ferromanganese (low and medium carbon): eastern zone, low carbon, bulk, c.l., 23c, 2000 lb. to c.l., 23.40c; medium, 14.50c and 15.20c; central, low carbon, bulk, c.l., 23.30c, 2000 lb. to c.l., 24.40c; medium, 14.80c and 16.20c; western, low carbon, bulk, c.l., 24.50c, 2000 lb. to c.l., 25.40c; medium, 15.75c and 17.20c; f.o.b. shipping point, freight allowed.

Spiegeleisen: 19-21%, carlots per gross ton, Palmerton, Pa. $36; 16-19%, $35.

Electrolytic Manganese: 99.9% plus, less ton lots, per lb. 37.6 cents.

Chromium Metal: 97% min. chromium, max. .50% carbon, eastern zone, bulk, c.l., 79.50c, 2000 lb. to c.l., 80c; central, 81c and 82.50c; western, 82.25c and 84.75c; f.o.b. shipping point, freight allowed.

Ferrocolumbium: 50-60%, per lb. contained columbium in gross ton lots, contract basis, f.o.b. Niagara Falls, N. Y. $2.25; less-ton lots $2.30. Spot prices 10 cents per lb. higher.

Ferrochrome: High carbon, eastern zone, bulk, c.l., 13c, 2000 lb. to c.l., 13.90c; central, add .40c and .65c; western, add 1c and 1.85c —low carbon, eastern, bulk, c.l., max. 0.06% carbon, 23c, 0.10% 22.50c, 0.15% 22c, 0.20% 21.50c, 0.50% 21c, 1.00% 20.50c, 2.00% 19.50c; 2000 lb. to c.l., 0.06% 24c, 0.10% 23.50c, 0.15% 23c, 0.20% 22.50c, 0.50% 22c, 1.00% 21.50c, 2.00% 20.50c; central, add .4c for bulk, c.l. and .65c for 2000 lb. to c.l.; western, add 1c for bulk, c.l. and 1.85c for 2000 lb. to c.l.; carload packed differential .45c; f.o.b. shipping point, freight allowed. Prices per lb. contained Cr.

Briquets: Ferrochrome, containing exactly 2-lb. Cr., eastern zone, bulk, c.l., 8.25c per lb. of briquets, 2000 to c.l., 8.75c; silicomanganese briquets, containing exactly 2 lb. manganese and ¼ lb. silicon, bulk, c.l., 5.80c, 2000 lb. to c.l., 6.30c; ferrosilicon briquets, approximately 5 lb. and containing exactly 2 lb. of silicon, or weighing approximately 2½ lb. and containing exactly 1 lb. of silicon, bulk, c.l., 3.35c, 2000 lb. to c.l., 3.80c; central, ferrochrome, .3c for c.l. and .5c for 2000 lb. to c.l.; silicomanganese, add .25c for c.l. and 1c for 2000 lb. to c.l.; ferrosilicon, add .15c for c.l. and .40c for 2000 lb. to c.l.; western, ferrochrome, add .70c for c.l. and 2c for 2000 to c.l., silicomanganese, add .55c for c.l. and 2c for 2000 lb. to c.l., ferrosilicon, add .30c for c.l. and .45c for 2000 to c.l.; f.o.b. shipping point, freight allowed.

Ferromolybdenum: 55-75%, per lb. contained molybdenum, f.o.b. Langeloth and Washington, Pa., furnace, any quantity 95.00c.

Ferrophosphorus: 17-19%, based on 18% phosphorus content, with unitage of $3 for each 1% of phosphorus above or below the base; gross tons per carload f.o.b. sellers' works, with freight equalized with Rockdale, Tenn.; contract price $58.50, spot $62.25.

Ferrosilicon: Eastern zone, 90-95%, bulk, c.l., 11.05c, 2000 lb. to c.l., 12.30c; 80-90%, bulk c.l., 8.90c, 2000 lb. to c.l., 9.95c; 75%, bulk, c.l., 8.05c, 2000 lb. to c.l., 9.05c; 50%, bulk, c.l., 6.65c and 2000 lb. to c.l., 7.85c; central, 90-95%, bulk, c.l., 11.20c, 2000 lb. to c.l., 12.80c; 80-90%, bulk, c.l., 9.05c, 2000 to c.l., 10.45c; 75%, bulk, c.l., 8.20c, 2000 lb. to c.l., 9.65c; 50% bulk, c.l., 7.10c, 2000 lb. to c.l., 9.76c; western, 90-95%, bulk, c.l., 11.65c, 2000 lb to c.l., 15.60c; 80-90%, bulk, c.l., 9.55c, 2000 lb. to c.l., 13.50c; 75%, bulk, c.l., 8.75c, 2000 to c.l., 13.10c; 50%, bulk, c.l., 7.25c, 2000 to c.l., 8.75c; f.o.b. shipping point, freight allowed. Prices per lb. contained silicon.

Silicon Metal: Min. 97% and max. 1% iron, eastern zone, bulk, c.l., 12.90c, 2000 lb. to c.l., 13.45c; central, 13.20c and 13.90c; western, 13.85c and 16.80c; min. 97% and max. 2% iron, eastern, bulk, c.l., 12.50c, 2000 lb. to c.l., 13.10c; central, 12.80c and 13.55c; western, 13.45c and 16.50c; f.o.b. shipping point, freight allowed. Prices per lb. contained silicon.

Silicomanganese: Max. 1.50 carbon, bulk, c.l., eastern zone, 6.05c, 2000 lb. to c.l., 6.70c; central, add .25c and 1.00c; western, .55c and 2.00c; f.o.b. shipping point, freight allowed; all prices per pound of alloy.

Manganese Metal: 96 to 98% manganese, max. 2% iron, eastern zone, bulk, c.l., 39.60c, 2000 lb. to c.l., 40c; central, 39.85c and 41c; western, 40.15c and 43.05c; 95 to 97% manganese, max. 2.50% iron, eastern, bulk, c.l., 35.60, 2000 c.l., 36c; central, 35.85c and 37c; western, 36.15c and 39.05c; f.o.b. shipping point, freight allowed.

Ferrotungsten: Carlots, per lb. contained tungsten, $1.90.

Tungsten Metal Powder: 98-99%, per lb. any quantity $2.55-2.65.

Ferrotitanium: 40-45%, f.o.b. Niagara Falls, N. Y., per lb. contained titanium: ton lots $1.23; less-ton lots $1.25. Spot up 5 cents per lb.

Ferrotitanium: 20-25%, 0.10 maximum carbon; per lb. contained titanium; ton lots $1.35; less-ton lots $1.40. Spot 5 cents per lb. higher.

High-Carbon Ferrotitanium: 15-20%, contract basis, per gross ton, f.o.b. Niagara Falls, N. Y., freight allowed to destinations east of Mississippi River and North of Baltimore and St. Louis, 6-8% carbon $142.50; 3-5% carbon $157.50.

Ferrovanadium: 35-40%, contract basis, per lb. contained vanadium, f.o.b. producers plant with usual freight allowances; open-hearth grade $2.70; special grade $2.80; highly-special grade $2.90.

Zirconium Alloys: 12-15%, contract basis, carloads bulk, per gross ton $102.50; packed $107.50; ton lots $108; less-ton lots $112.50. Spot $5 per ton higher.

Zirconium Alloy: 35-40%, contract basis, carloads in bulk or package, per lb. of alloy 14.00c; gross ton lots 15.00c; less-ton lots 16.00c. Spot ¼-cent higher.

Alsifer: (Approx. 20% aluminum, 40% silicon, 40% iron) contract basis, f.o.b. Niagara Falls, N. Y., per lb. 7.50c; ton lots 8.00c. Spot ¼-cent higher.

Simanal: (Approx. 20% each silicon, manganese, aluminum) Contract basis, freight allowed, per lb. of alloy; carlots 9.50c; ton lots 10.00c, less ton lots, 10.50c.

Borosil: 3 to 4% boron, 40 to 45% si., $7 lb. cont. Bo., f.o.b. Philo, O.

WAREHOUSE STEEL PRICES

Base delivered price, cents per pound, for delivery within switching limits, subject to established extras.

	Hot rolled bars	Structural shapes	Plates	Floor plates	Hot rolled sheets (10 gage base)	Hot rolled bands (12 gage and heavier)	Hot rolled hoops (14 gage and lighter)	Galvanized flat sheets (24 gage base)	Coldrolled sheets (17 gage base)	Cold finished bars	Cold-rolled strip	NE hot bars 8600 series	NE hot bars 9400 series
Boston	4.044[1]	3.912[1]	3.912[1]	5.727[1]	3.774[1]	4.106[1]	5.106[1]	5.224[14]	4.744[14]	4.144[11]	4.715	7.762[23]	6.062[23]
New York	3.853[1]	3.758[1]	3.768[1]	5.574[1]	3.590[1]	3.974[1]	3.974[1]	5.010[13]	4.613[14]	4.103[11]	4.774	.....	.....
Jersey City	3.853[1]	3.747[1]	3.768[1]	5.574[1]	3.590[1]	3.974[1]	3.974[1]	5.010[13]	4.613[14]	4.103[11]	4.774	.....	.....
Philadelphia	3.822[1]	3.666[1]	3.605[1]	5.272[1]	3.518[1]	3.922[1]	4.272[1]	5.018[16]	4.872[22]	4.072[11]	4.772	7.566[23]	5.866[23]
Baltimore	3.802[1]	3.759[1]	3.594[1]	5.252[1]	3.394[1]	3.902[1]	4.252[1]	4.894[1]	4.852[25]	4.052[11]	.....	.....	.....
Washington	3.941[1]	3.930[1]	3.796[1]	5.341[1]	3.596[1]	4.041[1]	4.391[1]	5.196[17]	4.841[25]	4.041[11]	.....	.....	.....
Norfolk, Va.	4.065[1]	4.002[1]	3.971[1]	5.465[1]	3.771[1]	4.165[1]	4.515[1]	5.371[17]	4.965[24]	4.165[11]	.....	.....	.....
Bethlehem, Pa.*	.....	3.45[1]	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....
Claymont, Del.*	.....	.....	3.45[1]	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....
Coatesville, Pa.*	.....	.....	3.45[1]	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....
Buffalo (city)	3.35[1]	3.40[1]	3.65[1]	5.26[1]	3.35[1]	3.819[1]	3.819[1]	4.75[18]	4.40[19]	3.75[21]	4.66	7.35[23]	5.65[23]
Buffalo (country)	3.25[1]	3.30[1]	3.30[1]	4.90[1]	3.25[1]	3.81[1]	3.81[1]	4.65[18]	4.30[19]	3.65[21]	4.35	7.35[23]	5.65[23]
Pittsburgh (city)	3.35[1]	3.40[1]	3.40[1]	5.00[1]	3.35[1]	3.60[1]	3.60[1]	4.75[18]	4.40[24]	3.75[21]	.....	7.45[23]	5.75[23]
Pittsburgh (country)	3.25[1]	3.30[1]	3.30[1]	4.90[1]	3.25[1]	3.50[1]	3.50[1]	4.65[18]	4.30[24]	3.65[21]	.....	.....	.....
Cleveland (city)	3.35[1]	3.588[1]	3.40[1]	5.188[1]	3.35[1]	3.60[1]	3.60[1]	4.877[18]	4.40[24]	3.75[21]	4.45	7.556[23]	5.856[23]
Cleveland (country)	3.25[1]	.....	3.30[1]	.....	3.25[1]	3.50[1]	3.50[1]	.....	4.30[24]	3.65[21]	4.35[21]	.....	.....
Detroit	3.450[1]	3.661[1]	3.609[1]	5.281[1]	3.450[1]	3.700[1]	3.700[1]	5.000[13]	4.500[24]	3.800[21]	4.659	7.680[23]	5.980[23]
Omaha (city, delivered)	4.115[1]	4.165[1]	4.165[1]	5.765[1]	3.865[1]	4.215[1]	4.215[1]	5.608[10]	5.443[24]	4.443[21]	.....	.....	.....
Omaha (country, base)	4.015[1]	4.065[1]	4.065[1]	5.665[1]	3.765[1]	4.115[1]	4.115[1]	5.508[10]	.....	.....	.....	.....	.....
Cincinnati	3.611[1]	3.691[1]	3.661[1]	5.291[1]	3.425[1]	3.675[1]	3.675[1]	4.825[10]	4.475[24]	4.011[21]	4.711	6.10	6.20
Youngstown, O.*	.....	.....	.....	.....	.....	.....	.....	4.40[13]	.....	.....	.....	.....	.....
Middletown, O.*	.....	.....	.....	.....	3.25[1]	3.50[1]	3.50[1]	4.65[18]	.....	.....	.....	.....	.....
Chicago (city)	3.50[1]	3.55[1]	3.55[1]	5.15[1]	3.25[1]	3.60[1]	3.60[1]	5.231[18]	4.20[24]	3.75[21]	4.65	5.75[23]	5.85[23]
Chicago (country)	3.40[1]	3.45[1]	3.45[1]	5.05[1]	3.15[1]	3.50[1]	3.50[1]	4.85[18]	4.10[24]	3.65[21]	4.55	5.75[23]	5.85[23]
Milwaukee	3.637[1]	3.687[1]	3.687[1]	5.287[1]	3.387[1]	3.737[1]	3.737[1]	5.272[18]	4.337[24]	3.887[21]	4.787	5.987[23]	6.087[23]
Indianapolis	3.58[1]	3.63[1]	3.63[1]	5.23[1]	3.518[1]	3.768[1]	3.768[1]	4.918[18]	4.568[24]	3.98[21]	4.78	6.08[23]	6.18[23]
St. Paul	3.76[2]	3.81[2]	3.81[2]	5.41[2]	3.51[2]	3.86[2]	3.86[2]	5.257[18]	4.46[24]	4.361[21]	5.102	6.09[23]	6.19[23]
St. Louis	3.647[1]	3.697[1]	3.697[1]	5.297[1]	3.397[1]	3.747[1]	3.747[1]	5.172[18]	4.347[24]	4.031[21]	4.931	6.131[23]	6.231[23]
Memphis, Tenn.	3.90[3]	3.95[3]	3.95[3]	5.71[3]	3.85[3]	4.10[3]	4.10[3]	5.25[11]	4.66[24]	4.31[21]	.....	.....	.....
Birmingham (city)	3.50[3]	3.55[3]	3.55[3]	5.83[3]	3.45[3]	3.70[3]	3.70[3]	4.75[20]	4.78[24]	4.43[21]	.....	.....	.....
Birmingham (country)	3.40[3]	3.45[3]	3.45[3]	5.83[3]	3.35[3]	3.60[3]	3.60[3]	4.75[20]	4.78[24]	4.43[21]	.....	.....	.....
New Orleans (city)	4.10[4]	3.90[4]	3.90[4]	5.85[4]	3.95[4]	4.20[4]	4.20[4]	5.25[20]	4.95[20]	4.60[21]	5.00	.....	.....
New Orleans (country)	4.00[4]	3.80[4]	3.80[4]	5.75[4]	3.85[4]	4.10[4]	4.10[4]	5.15[20]	4.95[20]	4.60[21]	.....	.....	.....
Houston, Tex.	3.75[2]	4.25[2]	4.25[2]	5.50[2]	3.75[2]	4.30[2]	4.30[2]	5.25[20]	5.43[20]	4.50[21]	.....	.....	.....
Los Angeles	4.35[4]	4.60[4]	4.90[4]	7.15[4]	4.95[4]	4.90[4]	6.70[4]	5.95[15]	7.15[2]	5.70[21]	.....	9.55[23]	8.55[23]
San Francisco (city)	3.95[7]	4.35[7]	4.65[7]	6.35[7]	4.55[7]	4.50[7]	4.50[7]	6.60[20]	7.55[20]	5.55[21]	.....	9.80[2]	8.80[2]
San Francisco (country)	3.85[7]	4.25[7]	4.55[7]	6.25[7]	4.45[7]	4.40[7]	4.40[7]	6.50[20]	7.45[20]	5.45[21]	.....	.....	.....
Tacoma	4.20[2]	4.45[2]	4.75[2]	6.50[2]	4.65[2]	4.25[2]	5.45[2]	5.70[2]	6.63[24]	5.75[21]	.....	.....	.....
Seattle (city)	4.20[2]	4.45[2]	4.75[2]	6.50[2]	4.65[2]	4.35[2]	5.45[2]	5.70[2]	6.63[24]	5.75[21]	.....	.....	8.00[2]

*Basing point cities, with quotations representing mill prices, plus warehouse spread.

NOTE—All prices fixed by Office of Price Administration in amendments Nos. 10 to 16 to Revised Price Schedule No. 49. Deliveries outside above cities computed in accordance with regulations.

BASE QUANTITIES

[1]—400 to 1999 pounds; [2]—400 to 14,999 pounds; [3]—any quantity; [4]—300 to 1999 pounds; [5]—400 to 3999 pounds; [6]—300 to 1999 pounds; [7]—400 to 39,999 pounds; [8]—under 2000 pounds; [9]—under 4000 pounds; [10]—500 to 1499 pounds; [11]—one bundle to 39,999 pounds; [12]—150 to 2249 pounds; [13]—150 to 1499 pounds; [14]—three to 24 bundles; [15]—450 to 1499 pounds; [16]—one bundle to 1499 pounds; [17]—one to nine bundles; [18]—one to six bundles; [19]—100 to 749 pounds; [20]—300 to 1999 pounds; [21]—1500 to 39,999 pounds; [22]—1500 to 1999 pounds; [23]—1000 to 39,999 pounds; [24]—400 to 1499 pounds; [25]—1000 to 1999 pounds; [26]—under 25 bundles. Cold-rolled strip, 2000 to 39,999 pounds, base.

Ores

Lake Superior Iron Ore
Gross ton, 51½% Lower Lake Ports

Old range bessemer	$4.75
Mesabi nonbessemer	4.45
High phosphorus	4.35
Mesabi bessemer	4.60
Old range nonbessemer	4.60

Eastern Local Ore
Cents, unit, del. E. Pa.

Foundry and basic 56-63%, contract	13.00

Foreign Ore
Cents per unit, c.i.f. Atlantic ports

Manganiferous ore, 45-55% Fe., 6-10% Mang.	Nom.
N. African low phos.	Nom.
Spanish, No. African basic, 50 to 60%	Nom.
Brazil iron ore, 68-69% f.o.b. Rio de Janeiro	7.50-8.00c

Tungsten Ore

Chinese wolframite, per short ton unit, duty paid	$24.00

Chrome Ore
(Equivalent OPA schedules):
Gross ton f.o.b. cars, New York, Philadelphia, Baltimore, Charleston, S. C., Portland, Ore., or Tacoma, Wash. (S/S paying for discharging; dry basis; subject to penalties if guarantees are not met.)

Indian and African 48% 2.8:1	$41.00
48% 3:1	43.50
48% no ratio	31.00
South African (Transvaal) 44% no ratio	27.40
45% no ratio	28.30
48% no ratio	31.00
50% no ratio	32.80
Brazilian—nominal 44% 2.5:1 lump	33.65
48% 3:1 lump	43.50
Rhodesian 45% no ratio	28.30
48% no ratio	31.00
48% 3:1 lump	43.50
Domestic (seller's nearest rail) 48% 3:1	52.80
less $7 freight allowance	

Manganese Ore
Including war risk but not duty, cents per gross-ton unit, dry, f.o.b. cars, New Orleans and Mobile; 5 cents higher at Norfolk, Baltimore, Philadelphia, New York; adjustments for analysis variations. (Based on OPA schedules.)

Brazilian, 48%	73.8c
Brazilian, 46%	71.8c
Caucasian, 51%	75.3c
Caucasian, 50%	74.8c
Chilean, 48%	73.8c
Indian, 50%	74.8c
Indian, 48%	73.8c
South African, 48%	73.8c
South African, 46%	71.8c
(Duty Free)	
Cuban, 51%	86.5c
Cuban, 48%	85.0c
Cuban, 45%	82.0c
Philippine, 50%	85.0c
Domestic, 48%, f.o.b. mines	100.0c

Molybdenum

Sulphide conc., lb., Mo. cont., mines	$0.75

NATIONAL EMERGENCY STEELS (Hot Rolled)

(Extras for alloy content)

Designation	Chemical Composition Limits, Per Cent C	Mn.	Si.	Cr.	Ni.	Mo.	Basic open-hearth Electric furnace Bars per 100 lb.	Billets per G T	Bars per 100 lb.	Billets per G T
NE 1330	.28-.33	1.60-1.90	.20-.35	.....	.....	.....	$ .10	$2.00	.....	.....
NE 8613	.12-.17	.70- .90	.20-.35	.40-.60	.40-.70	.15-.25	.75	15.00	1.25	25.00
NE 8720	.13-.18	.70- .90	.20-.35	.40-.60	.40-.70	.20-.30	.80	16.00	1.30	26.00
NE 9253	.50-.60	.75-1.00	1.80-2.20	.....	.....	.....	.40	8.00	.....	.....
NE 9261	.55-.65	.75-1.00	1.10-2.20	.10-.25	.....	.....	.65	13.00	.....	.....
NE 9262	.55-.65	.75-1.00	1.80-2.20	.20-.40	.....	.....	.65	13.00	.....	.....
NE 9415	.13-.18	.80-1.10	.20-.35	.30-.50	.30-.60	.08-.15	.75	15.00	1.25	25.00
NE 9425	.23-.28	.80-1.10	.20-.35	.30-.50	.30-.60	.08-.15	.75	15.00	1.25	25.00
NE 9442	.40-.45	1.00-1.30	.20-.35	.30-.50	.30-.60	.08-.15	.85	17.00	1.35	27.00
NE 9537	.35-.40	1.20-1.50	.40-.60	.40-.60	.40-.70	.15-.25	1.20	24.00	1.70	34.00
NE 9545	.43-.48	1.20-1.50	.40-.60	.40-.60	.40-.70	.15-.25	1.20	24.00	1.70	34.00

Extras are in addition to a base price of 2.70c, per pound on finished products and $54 per gross ton on semifinished steel major basing points and are in cents per pound and dollars per gross ton. No prices quoted on vanadium alloy.

MAXIMUM PRICES FIXED BY OPA ON IRON AND STEEL SCRAP

Other than railroad grades quoted on the basis of basing point prices from which shipping point prices and consumers' delivered prices are to be computed. Scrap originating from railroads quoted delivered to consumers' plants located on the line of the railroad from which the material originated. All prices in gross tons. A basing point includes its switching district.

PRICES FOR OTHER THAN RAILROAD SCRAP

					ELECTRIC FURNACE, ACID OPEN-HEARTH AND FOUNDRY GRADES									
					Low Phos. Grades									
	OPEN HEARTH GRADES*	Mixed Bor., Turn., Machine Turnings	Cast Iron Borings	Shoveling Turnings	Billet, Bloom Forge Crops	Bar Crops and smaller; Punchings, Plate	Heavy Structural, Plate 3 ft. and less	Heavy Structural, Plate 2 ft. and less	Heavy Structural, Plate 1 ft. and less	Foundry Steel 2 ft. and less	Foundry Steel 1 ft. and less	Alloy-Free Low Phos. & Sulphur Turnings	First Cut Heavy Axle & Forge Turnings	Electric Furnace Bundles
Pittsburgh, Brackenridge, Butler, Johnstown, Midland, Monessen, Sharon, Steubenville, Weirton, Canton, Youngstown, Warren	$20.00	$15.00	$16.00	$17.00	$25.00	$22.50	$21.50	$22.00	$22.50	$21.50	$22.00	$18.00	$19.50	$21.00
Claymont, Coatesville, Harrisburg, Conshohocken, Phoenixville	18.75	13.75	14.75	15.75	23.75	21.25	20.25	20.75	21.25	20.25	20.75	16.75	18.25	19.75
Bethlehem	18.25	13.25	14.25	15.25	23.25	20.75	19.75	20.25	20.75	19.75	20.25	16.25	17.75	19.25
Buffalo	19.25	14.25	15.25	16.25	24.25	21.75	20.75	21.25	21.75	20.75	21.25	17.25	18.75	20.25
Cleveland, Middletown, Cincinnati, Portsmouth, Ashland	19.50	14.50	15.50	16.50	24.50	22.00	21.00	21.50	22.00	21.00	21.50	17.50	19.00	20.50
Detroit	17.85	12.85	13.85	14.85	22.85	20.35	19.35	19.85	20.35	19.35	19.85	15.85	17.35	18.85
Toledo	†17.35	12.85	13.85	14.85										
Chicago	18.75	13.75	14.75	15.75	23.75	21.25	20.25	20.75	21.25	20.25	20.75	16.75	18.25	19.75
Kokomo	18.25	13.25	14.25	15.25	23.25	20.75	19.75	20.25	20.75	19.75	20.25	16.25	17.75	19.25
Duluth	18.00	13.00	14.00	15.00	23.00	20.50	19.50	20.00	20.50	19.50	20.00	16.00	17.50	19.00
St. Louis	17.50	12.50	13.50	14.50	22.50	20.00	19.00	19.50	20.00	19.00	19.50	15.50	17.00	18.50
Birmingham, Atlanta, Alabama City, Los Angeles, San Francisco, Pittsburg, Calif.	17.00	12.00	13.00	14.00	22.00	19.50	18.50	19.00	19.50	18.50	19.00	15.00	16.50	18.00
Minnequa, Colo.	16.50	11.50	12.50	13.50	21.50	19.00	18.00	18.50	19.00	18.00	18.50	14.50	16.00	17.50
Seattle	14.50	9.50	10.50	11.50	19.50	17.00	16.00	16.50	17.00	16.00	16.50	12.50	14.00	15.50

RAILROAD SCRAP

	Heavy Melting Steel	Scrap Rails	Rails for Rolling	Scrap Rails 3 ft. and under	Scrap Rails 2 ft. and under	Scrap Rails 18 in. and under
Pittsburgh, Wheeling, Steubenville, Sharon, Youngstown, Canton	$21.00	$22.00	$23.50	$24.00	$24.25	$24.50
Philadelphia, Wilmington, Sparrows Point	19.75	20.75	22.25	22.75	23.00	23.25
Cleveland, Cincinnati, Middletown, Ashland, Portsmouth	20.50	21.50	23.00	23.50	23.75	24.00
Chicago	19.75	20.75	22.25	22.75	23.00	23.25
Buffalo	20.25	21.25	22.75	23.25	23.50	23.75
Detroit	18.85	19.85	21.35	21.85	22.10	22.35
Kokomo	19.25	20.25	21.75	22.25	22.50	22.75
Duluth	19.00	20.00	21.50	22.00	22.25	22.50
Kansas City, Mo.	17.00	18.00	19.50	20.00	20.25	20.50
St. Louis	18.50	19.50	21.00	21.50	21.75	22.00
Birmingham	18.00	19.00	20.50	21.00	21.25	21.50
Los Angeles, San Francisco	18.00	19.00	20.50	21.00	21.25	21.50
Seattle	15.50	16.50	18.00	18.50	18.75	19.00

CAST IRON SCRAP OTHER THAN RAILROAD

(Shipping point prices in gross tons)

	Group A	Group B	Group C
No. 1 Cupola Cast	$18.00	$19.00	$20.00
No. 1 Machinery Cast, Drop Broken, 150 lbs. & Under	18.00	19.00	20.00
Clean Auto Cast	18.00	19.00	20.00
Stove Plate	17.00	18.00	19.00
Unstripped Motor Blocks	15.50	16.50	17.50
Heavy Breakable Cast	15.50	16.50	17.50
Charging Box Size Cast	17.00	18.00	19.00
Miscellaneous Malleable	20.00	21.00	22.00

Group A includes the states of Montana, Idaho, Wyoming, Nevada, Utah, Arizona and New Mexico.
Group B includes the states of North Dakota, South Dakota, Nebraska, Colorado, Kansas, Oklahoma, Texas and Florida.
Group C includes states not named in groups A and B, plus Kansas City, Kans.-Mo.

*Open Hearth Grades refer to No. 1 heavy melting steel, No. 1 hydraulic compressed black sheet scrap, No. 2 heavy melting steel, dealers' No. 1 bundles, dealers' No. 2 bundles and No. 1 busheling. No. 1 chem. borings, 1 per cent oil, $1 under, No. 2, 1.5 per cent oil, $2 under heavy melting steel. No. 3 bundles, $2 under No. 1 heavy melting; cast steel, $2.50 over, No. 2 busheling, $2.50 under No. 1 heavy melting steel, auto springs, crankshafts, $1 over No. 1 heavy melting. †Toledo open-hearth grades cover only No. 2 busheling.

A basing point includes the switching district of the city named. The Pittsburgh basing point includes the switching districts of Bessemer, Homestead, Duquesne, Munhall and McKeesport, Pa. Cincinnati includes Newport, Ky. St. Louis basing point includes Granite City, East St. Louis and Madison, Ill. San Francisco includes South San Francisco, Niles and Oakland, Calif. Chicago includes Gary, Ind. Claymont, Del., includes Chester, Pa.

Inferior Grades: Maximum prices of inferior grades shall continue to bear the same differential below the corresponding listed grades as existed from Sept. 1, 1940, to Jan. 31, 1941. No premium allowed on grades considered superior, unless approved by OPA. Addition of special preparation charges prohibited. Purchase of electric furnace or foundry grades for open hearth or blast furnace use permitted only at no more than price for corresponding open hearth grade. Exceptions: Low phos. billet, bloom and forge crops and electric furnace bundles may exceed open hearth price, and electric furnace bundles may exceed blast furnace price, if material is delivered to the consumer direct from the original industrial producer.

Commissions: No commission is payable except by a consumer to a broker for services rendered, the commission not to exceed 50 cents per gross ton. No commission is payable unless: The broker guarantees the quality and delivery of an agreed tonnage the scrap is purchased at a price no higher than the maximum allowed; the broker sells the scrap to the consumer at the same price at which he purchased it; the broker does not split the commission with the seller of the scrap, with another broker or sub-broker, or with the consumer. Commissions must be shown as separate item on invoice.

Maximum Shipping Point Price: Where shipment to consumer is by rail, vessel or combination of both, scrap is at its shipping point when it has been placed f.o.b. railroad car or f.a.s. vessel. In such cases, maximum shipping point prices are: (1) For shipping points located within a basing point, the price listed in the above table for scrap at the basing point in which the shipping point is located, minus the lowest established switching charge for scrap within the basing point; and (2) for shipping points located outside a basing point, the price in the above table for scrap at the most favorable basing point, minus the lowest transportation charge by rail, water or combination thereof. When vessel movement is involved, dock charges shall be 50 cents at Memphis, $1 at Great Lakes ports, $1.25 at New England ports, 75 cents elsewhere. New England shipping point prices computed on most favorable basing point prices; maximum transportation charge on scrap from New England, $6.65 per ton.

Scrap shipped by motor vehicle is at its shipping point when loaded. For shipping points within basing points, maximum is price listed in table minus lowest switching charge. When outside basing point, maximum is price at most favorable basing point minus lowest established charge when hauled by common carrier. When hauled by seller charges are based on carload rate for rail shipment, minimum $1.00 per ton.

Maximum Delivered Prices: Determined by adding established transportation charges to shipping point price, not to exceed by more than $1 (plus freight rate increase March 18, 1942) the prices listed in the table for the nearest basing point. Certain exceptions specified in Revised Price Schedule No. 4 (Amendment 1) apply to St. Louis district consumers, to WPB allocations, to water shipments from Duluth or Superior, Wis., to shipments of billets, blooms and forge crops from Pittsburgh and to shipments of electric and foundry grades from Michigan; to shipments of turnings to ferroalloy producers and of borings to chemical users. Delivered prices of scrap shipped under WPB allocations may exceed prices at nearest basing point by more than $1, if most economical transportation is used.

Unprepared Scrap: Above prices are for prepared scrap. Maximum prices for unprepared scrap are $3.50 less; (material from which Nos. 1, 2 and 3 bundles made is $4 less) than for the corresponding grades of prepared scrap, except for heavy breakable cast. In no case shall electric furnace and foundry grades be used as the "corresponding grades of prepared scrap."

Remote Scrap: Consists of all grades, except railroad scrap, in Florida, Montana, Idaho, Wyoming, Nevada, Arizona, New Mexico, Texas, Oklahoma, Oregon, Washington, Louisiana, Utah, Arkansas, Nebraska, Kansas. Delivered price may exceed by not more than $7 the price at the basing point nearest consumer's plant, provided sworn details furnished OPA. Permission required to exceed by more than $7 the nearest basing point price. Colorado is remote for Colorado consumers only.

NONFERROUS METAL PRICES

Copper: Electrolytic or Lake from producers in carlots 12.09c, Del. Conn., less carlots 12.12½, refinery; dealers may add ⅛c for 5000 lbs. to carload; 1000-4999 lbs. 1c; 500-999 1½c; 0-499 2c. Casting, 11.75c, refinery for 20,000 lbs., or more, 12.00c less than 20,000 lbs.

Brass Ingot: Carlot prices, including 25 cents per hundred freight allowance; add ¼c for less than 20 tons; 85-5-5-5 (No. 115) 12.25c; 88-10-2 (No. 215) 16.50c; 80-10-10 (No. 305) 14.25c; Navy G (No. 225) 16.75c; Navy M (No. 245) 14.75c; No. 1 yellow (No. 405) 10.00c; manganese bronze (No. 420) 12.75c.

Zinc: Prime western 8.25c, select 8.35c, brass special 8.50c, intermediate 8.75c, E. St. Louis, for carlots. For 20,000 lbs. to carlots add 0.15c; 10,000-20,000 0.25c; 2000-10,000 0.40c; under 2000 0.50c.

Lead: Common 6.35c, corroding or chemical, 6.40c, E. St. Louis for carloads; add 5 points for Chicago, Minneapolis-St. Paul, Milwaukee-Kenosha districts; add 15 points for Cleveland-Akron-Detroit area, New Jersey, New York State, Texas, Pacific Coast, Richmond, Indianapolis-Kokomo; add 20 points for Birmingham, Connecticut, Boston-Worcester-Springfield, New Hampshire, Rhode Island.

Primary Aluminum: 99% plus, ingots 15.00c del., pigs 14.00c del.; metallurgical 94% min. 13.50c del. Base 10,000 lbs. and over; add ½c 2000-9999 lbs.; 1c less than 2000 lbs.

Secondary Aluminum: All grades 14.00c per lb. except as follows: Low-grade piston alloy (No. 122 type) 13.50c; No. 12 foundry alloy (No. 2 grade) 13.50c; chemical warfare service ingot (92½% plus) 13.50c; steel deoxidizers in notchbars, granulated or shot, Grade 1 (95-97½%) 13.75c, Grade 2 (92-95%) 13.50c, Grade 3 (90-92%) 13.00c, Grade 4 (85-90%) 12.50c; any other ingot containing over 1% iron, except PM 754 and hardeners, 13.50c. Above prices for 30,000 lb. or more; add ¼c 10,000-30,000 lb.; ½c 1000-10,000 lbs.; 1c less than 1000 lbs. Prices include freight at carload rate up to 75 cents per hundred.

Magnesium: Commercially pure (99.8%) standard ingots (4-notch, 17 lbs.) 20.50c lb.; add 1c for special shapes and sizes, including 3-lb. ingot and 12-lb. round ingot; incendiary bomb alloy 23.40c, 50-50 magnesium-aluminum 23.75c, ASTM B80-41T No. 11 25.00c, ASTM B94-40T No. 13 25.00c, all others 23.00c. Prices for 100 lbs. or more; for 25-100 lbs. add 10c; for less than 25 lbs. 20c; incendiary bomb alloy f.o.b. plant any quantity; carload freight rate allowed all others for 500 lbs. or more.

Tin: Prices ex-dock, New York in 5-ton lots. Add 1 cent for 2240-11,199 lbs., 1½c 1000-2239, 2½c 500-999, 3c under 500. Grade A, 99.8% or higher (includes Straits), 52.00c; Grade B, 99.75-99.79% incl. 51.62½c; Grade C, Cornish refined 51.62½c; Grade D, 99.0-99.74% incl. 51.12½c; Grade E, below 99%, 51.00c.

Antimony: American, bulk, carlots, f.o.b. Laredo, Tex., 99.0-99.8% grade 14.50c, 99.8% and over (arsenic 0.05% max.; no other impurity to exceed 0.1% 15.00c. Add ¼c for less-carlots to 10,000 lbs.; ½c for 9999-224 lbs.; 2c for 223 lbs. and less.

Nickel: Electrolytic cathodes, 99.5%, f.o.b. refinery 35.00c lb.; pig and shot produced from electrolytic cathodes 36.00c; "F" nickel shot or ingot for additions to cast iron, 34.00c; Monel shot 28.00c.

Mercury: Prices per 76-lb. flask f.o.b. point of shipment or entry. Domestic produced in Calif., Oreg., Wash., Idaho, Nev., Ariz. $191; produced in Texas, Ark. $193. Foreign, produced in Mexico, duty paid, $193.

Arsenic: Prime, white, 99%, carlots, 4.00c lb.

Beryllium-Copper: 3.75-4.25% Be., $15 lb. contained Be.

Cadmium: Bars, ingots, pencils, pigs, plates, rods, slabs, sticks and all other "regular" straight or flat forms 90.00c lb., del.; anodes, balls, discs and all other special or patented shapes 95.00c lb. del.

Cobalt: 97-99%, $2.11 lb.; 100 lbs. or more on contract, $1.50 lb.

Indium: 99.5%, $10 per troy ounce.

Gold: U. S. Treasury, $35 per ounce.

Silver: Open market, N. Y. 44.75c per ounce.

Platinum: $36 per ounce.

Iridium: $165 per troy ounce.

Palladium: $24 per troy ounce.

Rolled, Drawn, Extruded Products

(Copper and brass product prices based on 12.00c, Conn., for copper. Freight prepaid on 100 lbs. or more.)

Sheet: Copper 20.87c; yellow brass 19.48c; commercial bronze, 90% 21.07c, 95% 21.28c; red brass, 80% 20.15c, 85% 20.36c; phosphor bronze, Grades A, B 5% 36.25c; Everdur, Herculoy, Duronze or equiv. 26.00c; naval brass 24.50c; manganese bronze 28.00c; Muntz metal 22.75c; nickel silver 5% 26.50c.

Rods: Copper, hot-rolled 17.37c, cold-rolled 18.37c; yellow brass 15.61c; commercial bronze 90% 21.32c, 95% 21.53c; red brass 80% 20.40c, 85% 20.61c; phosphor bronze Grade A, B 5% 36.50c; Everdur, Herculoy, Duronze or equiv. 25.50c; Naval brass 19.12c; manganese bronze 22.50c; Muntz metal 18.87c; nickel silver 5% 28.75c.

Seamless Tubing: Copper 21.37c; yellow brass 22.23c; commercial bronze 90% 23.47c; red brass 80% 22.80c, 85% 23.01c.

Extruded Shapes: Copper 20.87c; architectural bronze 19.12c; manganese bronze 24.00c, Muntz metal 20.12c; Naval brass 20.37c.

Angles and Channels: Yellow brass 27.98c; commercial bronze 90% 29.57c, 95% 29.78c; red brass 80% 28.65c, 85% 28.86c.

Copper Wire: Bare, soft, f.o.b. Eastern mills, carlots 15.37½c, less-carlots 15.87½c; weatherproof, f.o.b. Eastern mills, carlots 17.00c, less-carlots 17.50c; magnet, delivered, carlots 17.50c, 15,000 lbs. or more 17.75c, less carlots 18.25c.

Aluminum Sheets and Circles: 2s and 3s, flat, mill finish, base 30,000 lbs. or more; del.; sheet widths as indicated; circle diameters 9" and larger:

Gage	Width	Sheets	Circles
.249"-7	12"-48"	22.70c	25.20c
8-10	12"-48"	23.20c	25.70c
11-12	26"-48"	24.20c	27.00c
13-14	26"-48"	25.20c	28.50c
15-16	26"-48"	26.40c	30.40c
17-18	26"-48"	27.90c	32.90c
19-20	24"-42"	29.80c	35.30c
21-22	24"-42"	31.70c	37.20c
23-24	3"-24"	25.60c	29.20c

Lead Products: Prices to jobbers; full sheets 9.50c; cut sheets 9.75c; pipe 8.15c, New York; 8.50c Philadelphia, Baltimore, Rochester and Buffalo; 8.75c, Chicago, Cleveland, Worcester, Boston.

Zinc Products: Sheet f.o.b. mill, 13.15c; 36,000 lbs. and over deduct 7%. Ribbon and strip 12.25c, 3000-lb. lots deduct 1%, 6000 lbs. 2%, 9000 lbs. 3%, 18,000 lbs. 4%, carloads and over 7%. Boiler plate (not over 12") 3 tons and over 11.00c; 1-3 tons 12.00c; 500-2000 lbs. 12.50c; 100-500 lbs. 13.00c; under 100 lbs. 14.00c. Hull plate (over 12") add 1c to boiler plate prices.

Plating Materials

Chromic Acid: 99.75%, flake, del., carloads 16.25c; 5 tons and over 16.75c; 1-5 tons 17.25c; 400 lbs. to 1 ton 17.75c; under 400 lbs. 18.25c.

Copper Anodes: Base 2000-5000 lbs., del.; oval 17.62c; untrimmed 18.12c; electro-deposited 17.37c.

Copper Carbonate: 52-54% metallic cu; 250 lb. barrels 20.50c.

Copper Cyanide: 70-71% cu, 100-lb. kegs or bbls. 34.00c f.o.b. Niagara Falls.

Sodium Cyanide: 96%, 200-lb. drums 15.00c; 10,000-lb. lots 13.00c f.o.b. Niagara Falls.

Nickel Anodes: 500-2999 lb. lots; cast and rolled carbonized 47.00c; rolled, depolarized 49.00c.

Nickel Chloride: 100-lb. kegs or 275-lb. bbls. 18.00c lb., del.

Tin Anodes: 1000 lbs. and over 58.50c, del.; 500-999 59.00c; 200-499 59.50c; 100-199 61.00c.

Tin Crystals: 400 lb. bbls. 39.00c f.o.b. Grasselli, N. J.; 100-lb. kegs 39.50c.

Sodium Stannate: 100 or 300-lb. drums 36.50c, del.; ton lots 33.50c.

Zinc Cyanide: 100-lb. kegs or bbls. 38.00c, f.o.b. Niagara Falls.

Scrap Metals

Brass Mill Allowances: Prices for less than 15,000 lbs. f.o.b. shipping point. Add ⅝c for 15,000-40,000 lbs.; 1c for 40,000 lbs. or more.

	Clean Heavy	Red Ends	Clean Turnings
Copper	10.250	10.250	9.500
Tinned Copper	9.625	9.625	9.375
Yellow Brass	8.625	8.375	7.875
Commercial bronze 90%	9.375	9.125	8.625
95%	9.500	9.250	8.750
Red Brass, 85%	9.125	8.875	8.375
Red Brass, 80%	9.125	8.875	8.375
Muntz metal	8.000	7.750	7.250
Nickel Sil., 5%	9.250	9.000	4.625
Phos. br., A. B. 5%	11.00	10.750	9.750
Herculoy, Everdur or equivalent	10.250	10.000	9.250
Naval brass	8.250	8.000	7.500
Mang. bronze	8.250	3.000	7.500

Other than Brass Mill Scrap: prices apply on material not meeting brass mill specifications and are f.o.b. shipping point; add ⅝c for shipment of 60,000 lbs. of one group and ⅛c for 20,000 lbs. of second group shipped in same car. Typical prices follow:

(Group 1) No. 1 heavy copper and wire, No. 1 tinned copper, copper borings 9.75c; No. 2 copper wire and mixed heavy copper, copper tuyeres 8.75c.

(Group 2) soft red brass and borings, aluminum bronze 9.00c; copper-nickel and borings 9.25c; car boxes, cocks and faucets 7.75c; ball metal 15.50c; babbitt-lined brass bushings 13.00c.

(Group 3) zincy bronze borings, Admiralty condenser tubes, brass pipe 8.00c; Muntz metal condenser tubes 7.50c; yellow brass 6.25c; manganese bronze (lead 0.00%-0.40%) 7.25c, (lead 0.41%-1.0%) 6.25c; manganese bronze borings (lead 0.00-0.40%) 6.50c, (lead 0.41-1.00%) 5.50c.

Aluminum Scrap: Prices f.o.b. point of shipment, respectively for lots of less than 1000 lbs.; 1000-20,000 lbs. and 20,000 lbs. or more, plant scrap only. Segregated solids: S-type alloys (2S, 3S, 17S, 18S, 24S, 32S, 52S) 9.00c, 10.00c, 10.50c; All other high grade alloys 8.50c, 9.50c, 10.00c; low grade alloys 8.00c, 9.00c, 9.50c. Segregated borings and turnings: Wrought alloys (17S, 18S, 32S, 52S) 7.50c, 8.50c, 9.00c; all other high grade alloys 7.00c, 8.00c, 8.50c; low grade alloys 6.50c, 7.50c, 8.00c. Mixed plant scrap, all solids, 7.50c, 8.50c, 9.00c; borings and turnings 5.50c, 6.50c, 7.00c.

Lead Scrap: Prices f.o.b. point of shipment. For soft and hard lead, including cable lead, deduct 0.55c from basing point prices for refined metal.

Zinc Scrap: New clippings, old zinc 7.25c f.ob. point of shipment; add ½-cent for 10,000 lbs. or more. New die-cast scrap, radiator grilles 4.95c; add ½c 20,000 or more. Unsweated zinc dross, die cast slab 5.80c any quantity.

Nickel, Monel Scrap: Prices f.o.b. point of shipment; add ½c for 2000 lbs. or more of nickel or cupro-nickel shipped at one time and 20,000 lbs. or more of Monel. Converters (dealers) allowed 2c premium.

Nickel: 98% or more nickel and not over ½% copper 26.00c; 90-98% nickel, 26.00c per lb. nickel contained.

Cupro-nickel: 90% or more combined nickel and copper 26.00c per lb. contained nickel, plus 8.00c per lb. contained copper; less than 90% combined nickel and copper 26.00c for contained nickel only.

Monel: No. 1 castings, turnings 15.00c; new clipping 20.00c; soldered sheet 18.00c.

Sheets, Strip . . .

Sheet & Strip Prices, Page 150

Most sheet sellers are unable to promise any delivery before February on hot and cold-rolled, and some have very little left for that month. Galvanized sheet promises also have taken a spurt, with January about the best offered and some mills now not offering anything before March. This spurt is attributed to substantial lend-lease buying.

Only certain specialties, such as stainless steel and electrical sheets, appear to be still available for delivery this year.

Supply of cold-rolled sheets are short with some eastern distributors. Scheduled programs in some cases evidently call for additional fourth quarter tonnage, but little is available unless rolling schedules are revised.

Simultaneous sheet demands for war products in the Chicago area have intensified the delivery situation on this steel item considerably. The navy pontoon program, involving 144,000 units of one ton of steel each; together with the landing mat program, requiring between 400,000 and 500,000 tons, and the overseas container program taking 11,000,000 units have combined to substantially lengthen sheet deliveries.

Quotas of semifinished have not been much altered in recent months, but available steel is not enough to engage all rolling capacity in the Cincinnati district.

Distribution of sheet orders continues complicated by the plate program. Substantial tonnage of sheets has not been allotted to the mills because priorities given to Maritime Commission for plates have filled up most of the available time on continuous mills and the shortage of suitable semifinished material limits the available tonnage on the nonintegrated sheet mills. Army orders for drum stock, ammunition boxes and similar vital equipment are among those now awaiting placement.

Wire . . .

Wire Prices, Page 151

Production directives allow slightly more barbed wire, fencing and nails for civilian needs. Demand for common wire nails has eased more than cement-coated. Until recently the bulk of production on these products has been for the services and agricultural requirements have accumulated.

High carbon fine wires continue tight; most mills are sold through the fourth quarter. Specialty bookings are extending further into first quarter. On many products only gaps in revised schedules permit fourth quarter shipment.

Demand for wire for small springs is notably strong. Rope mills require large tonnages and in most instances these schedules have not been disturbed; high operations have kept down wire inventories with rope mills. In addition to merchant products, there are a few slightly larger releases for civilian needs. About 12,500 tons per quarter for bed springs may require bessemer material. Bolt and nut sizes in rods are sold well into first quarter with some products, also screw stock in both rods and finished wire.

Defense Supply Corp. has released some of its supplies of barbed wire to the farm trade, which has helped to ease a tight situation in the Chicago area. Demand for bale ties, netting and fence continues urgent. Nail requirements are off.

Bars . . .

Bar Prices, Page 150

Except for bar angles, carbon bar sellers are promising little before February. In the case of the larger rounds and flats, some sellers are nearly booked to March.

Substantial buying is under way in the New York district on both carbon and alloy bars for tractor program previously noted. One eastern manufacturer has an order for nearly 8500 units, requiring about 50,000 tons of steel, most of which is bar tonnage. Initial deliveries are wanted in December, and insofar as the hot alloy bars are concerned there should not be any difficulty. However, it appears little carbon bar tonnage will be available before January at the earliest.

The delivery situation on hot alloy bars continues easier than for carbon bars. Some producers can still furnish hot alloy tonnage in November and in a few instances, where ingots are available, tonnage can be supplied in October.

WPB is understood to be seeing what can be done toward the diversion of certain hot alloy facilities to the rolling of carbon bars, and also is requesting buyers to use electric furnace alloy steel instead of open hearth.

Little cold-rolled tonnage is available before January, although the situation in this product appears slightly improved.

Plates . . .

Plate Prices, Page 151

August plate shipments totaled 1,061,000 tons compared with 1,089,600 in July, and 1,079,866 tons in August, 1942, according to WPB steel officials.

Steel plate allocation numbers for first and second quarters are coming out more freely, with a result that most eastern producers have nothing available before late February and have increasingly substantial backlogs extending throughout the remainder of the first half.

High octane gasoline refinery tonnage is increasing again, with some being placed for fourth quarter under directives. At least one plate producer declares that this is the first important directive tonnage he has received since the inauguration of CMP.

Although there is every reason to believe most shipbuilders are heavily loaded on plates, Maritime Commission sources continue to press for more rapid delivery. Some producers in the Pittsburgh district feel the difficulty lies in improper distribution of sizes, and this is borne out by the fact Maritime Commission in recent weeks has attempted to make overnight changes in material already on the books.

Pipe. . .

Pipe Prices, Page 151

Order No. M-21-b-2, which permits warehouses to rebuild steel stocks, has resulted in a flurry of merchant pipe orders. Stocks held by jobbers are considerably better than a month ago. Demand, however, is off and probably will decline over the balance of the year.

Stocks now held by pipe jobbers probably represent the maximum which they will be permitted to buy until after the war, for inventories are now at permanent levels and only replacement pipe is expected to be shipped from now on. With virtually no new building, practically all standard pipe now moving is for maintenance and repair.

Little if any capacity is available over the balance of the year on drill pipe and casing. In line pipe a few additional feeder lines and miscellaneous repair pipe tonnages are noted. Mechanical tubing demand is steady, with a substantial volume validated for first and second quarter production.

Drill Pipe Orders Deluge Steel Producers

(*Concluded from Page* 63)

enough to insure early delivery. The result, which was the one desired by governmental circles, was that all drilling activity had to be satisfied with material held in stock by oil companies or jobbers. This has caused a general decline of such stocks, and with their disappearances, a sharp decline in drilling activity.

Need for new wells has now been recognized both by the Petroleum Administrator for War and by the War Production Board. Steel has been allocated for the purpose, and the rush of orders now being booked by producers is the result. It is obvious already that the tonnage of steel available for the purpose is far less than the immediate demand. Further allotments probably will be made in ensuing quarters.

However, the problem now facing producers is the arrangement of bookings so that the tonnage is equitably distributed, both among the various producers, and among the customers. It is not yet clear just how the tonnage will be distributed, but that is being cleared up by the Controlled Materials section of the WPB. This job is now in progress, and the various companies are circulating their excess orders in an effort to find a home for all the tonnage.

Structural Shapes . . .

Structural Shape Prices, Page 151

Structural steel inquiry remains light except for scattered projects developing out of war changes and the tag end of the original war plant program. Public work, unless tied in with the war, is at a standstill, bridges especially. Railroads are getting more shapes for cars and locomotives, but not for bridges.

Two aluminum extrusion plants in the Midwest, 11,000 tons, are outstanding in pending inquiry. Some additional tonnage for high octane gasoline production expansions is being estimated; in the East several industrial plant additions require around 250 tons each. Most of the used and so-called distress structural material has been absorbed; in some instances shapes included in the second category are of many sizes and are unsuitable for original designs. Delays in allotments of steel for some pending projects have slowed down activity.

On the basis of current inquiry for

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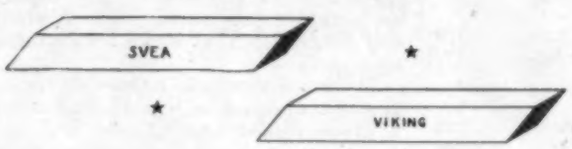

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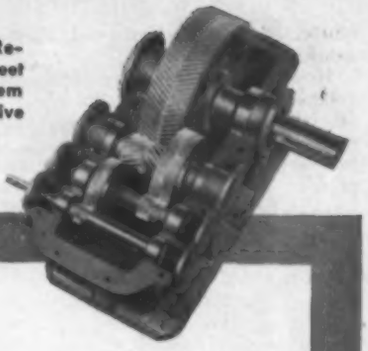

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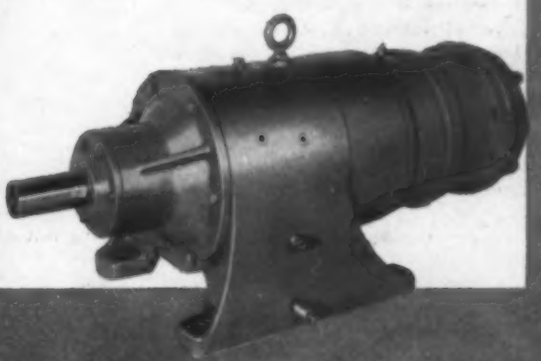

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fabricated structural material, most shops would be closed.

However many are engaged on ship subcontracts, pontoons, knocked down oil barges and miscellaneous war contracts, fabricating a minimum of shapes but larger tonnages of heavy sheets and plates. Plain material deliveries are extended further into the fourth quarter, although some tonnage is available for early November.

New business booked by the shape mills in the Pittsburgh area is above expectations, due primarily to continued heavy demand from shipbuilders. Miscellaneous Army orders account for most of the balance, with only a handful of shapes going for repair and maintenance work. Industry operations now average about 60 per cent of capacity.

Reinforcing Bars . . .

Reinforcing Bar Prices, Page 151

New construction projects continue few and far between. There are a handful of interesting road jobs in the Pittsburgh area now pending, and a scattering of buildings for Army and essential civilian uses. Reinforcing bar orders are declining slowly and in all probability will continue to do so. Average placement in the Pittsburgh area of 30,000 tons per month of new billet and rail bar orders, which has held since early this year, now shows signs of diminishing and the average for the next few months will probably run 20,000 to 25,000 tons.

Little business in reinforcing, except lots of a few tons each, is being placed in the Chicago district currently. The future also is not promising.

Pig Iron . . .

Pig Iron Prices, Page 152

Decline in pig iron requirements in New England, centering in gray iron shops since spring, appears to have levelled off without much progress in replacing lost volume. Basic and malleable demand is maintained.

Makers of steel and semi-steel castings are as near capacity as manpower permits, while steelworks are melting at capacity limited only by frequent minor repairs.

Steady and large pig iron consumers are shops producing valves and pumps; valve producers are also sub-contracting parts.

However, demand from gray iron shops still lags. They have not recovered from the slump in machine tool demand, limitations on production of regular equipment, failure to replace earlier completed war contracts and inability to fit into the shipbuilding program to a greater extent.

One feature of the New York pig iron market is the requests for more tonnage in the lower brackets for October delivery. While receiving no encouragement from WPB officials on the matter, some consumers believe they sense an easing in pig iron and consequently, having a use for the iron, they are requesting tonnage in the lower brackets more freely.

In view of the War Production Board's insistence in the matter, it is believed that virtually all requests for October iron will have been made out on the new WPB-3172 form, brought out ten days or so ago to succeed WPB-900.

Meanwhile, the melt continues to ease off, as indicated primarily by coke shipments.

Producers and distributors of pig iron in St. Louis area report October orders on a parity with the preceding month. Character of the buying is different, some plants taking less and others more. Labor shortage is acute in a number of foundries, and these are unable to produce as much as they are allowed to under WPB regulations.

August Ore Shipments Set Record; Behind for Season

Iron Ore Prices, Page 153

Shipment of iron ore down the Great Lakes established a new record for the second consecutive month during August, the Lake Superior Iron Ore Association reports.

August shipments of 13,976,770 gross tons compare with the previous high of 13,588,814 in the preceding month and 12,235,862 in corresponding month a year ago.

Unfavorable foggy weather towards the close of last month forced shipments to fall below earlier expectations of 14,000,000 tons. Ore shipments are expected to continue at near record levels this month.

For the season through to Sept. 1, movement of ore by vessel amounted to 52,359,474 gross tons, or 13.59 per cent below the 60,593,534 tons shipped in like 1942 period.

Details of August loadings are as follows:

SHIPMENTS FROM UPPER LAKE PORTS
Gross Tons—Railroad Weights

Port	August 1943	August 1942
Escanaba	992,405	761,372
Marquette	719,612	533,496
Ashland	844,309	910,671
Superior	4,706,126	4,683,169
Duluth	3,551,838	3,494,582
Two Harbors	3,095,601	2,793,616
Total U. S.	13,909,891	13,176,906
Michipicoten	66,879	58,956
Grand Total	13,976,770	13,235,862

Increase over year ago, 740,908 tons.

Cumulative loadings to September 1 are as follows:

Port	To Sept. 1, 1943	To Sept. 1, 1942
Escanaba	3,902,575	4,091,567
Marquette	2,615,757	3,144,249
Ashland	3,504,057	4,526,393
Superior	17,881,762	21,677,221
Duluth	12,604,817	15,092,062
Two Harbors	11,600,988	11,740,978
Total U. S.	52,109,956	60,272,470
Michipicoten	249,518	321,064
Grand Total	52,359,474	60,593,534

Decrease over year ago, 8,234,060 tons.

Scrap . . .

Scrap Prices, Page 154

Volume of scrap flowing to consumers in the Chicago area continues small. Receipts have dropped slightly, jeopardizing meager inventories.

Drop in industrial scrap production, result of war plant changeovers, and insufficient manpower in the scrap collection and preparation industry, are combining to reduce the supply of available material.

Steelmaking grades are tighter in the East; supplies reaching dealer yards are limited and production of some plant scrap has slackened, including carbon and alloy turnings. More scrap is moved by allocation and for the most part within ceilings at delivered points. Some consumers are not buying bundles.

Tonnage produced by shipyards is heavier and a substantial part is allocated, frequently by-passing dealers.

Cast grades are slow; larger foundry consumers are not buying, but the mills readily take heavy breakable machinery cast which is scarce. Blast furnaces will take borings and turnings; straight carbon turnings find a steady market with steelworks, notably crushed material, but alloy turnings continue slow with mills reluctant to buy in volume. Some consumers are accepting mixed alloy turnings only on allocation.

Movement of scrap to Buffalo by barge canal thus far this year is lower than last, due in part to a shortage of barges. However, the leading scrap consumer in that area recently received about 25,000 tons in water shipments. The local scrap movement is off sharply due to labor shortage.

There are growing apprehensions about scrap supplies for the late fall and winter.

Tin Plate . . .

Tin Plate Prices, Page 151

With the tin plate program for the balance of the year set, speculation in the industry is turning to possibilities for 1944. Estimates vary widely as to the volume of electrolytic plate, dipped tin plate and bonderized products which will be produced, as well as the overall tonnage.

The more optimistic sources in the industry are hoping for a three million ton production next year. There will undoubtedly be a substantial increase in production of electrolytic tin plate. Practically all electrolytic units will be in operation before the end of 1943, and estimates for 1944 production of electrolytic plate vary from one million to two million tons. However, the can companies are not at all satisfied with electrolytic plate in some applications and there is no assurance that heavy buying for the export markets, both by the Army and the Lend-Lease Administration, will be in electrolytic plate.

Manufacturers of bottle caps are doing a boom business despite the freezing of tin plate, picking up frozen inventories wherever possible.

Semifinished Steel . . .

Semifinished Prices, Page 150

Yield of finished steel per ingot in production of considerable special quality carbon steel is low, 70 per cent and less in many instances. Excessive hot-topping, cropping and chipping accounts for this.

Tonnage and quality losses are also encountered because of poor grade sulphuric coking coal; yield for some quality steels for munitions has at times been as low as 55 per cent.

There is some exchange of semifinished among integrated mills with cross-

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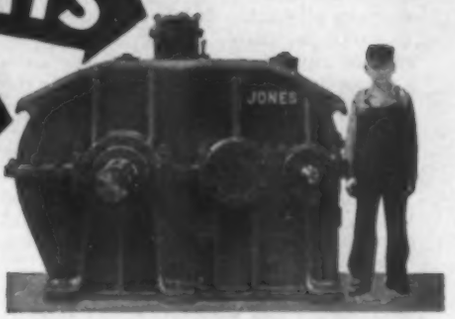

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hauling held to a minimum, although complete elimination is difficult if production quotas are to be met. Non-integrated mills as a rule are supplied to meet schedules which vary widely as to products; plates are at 135-140 per cent of capacity; sheets 60-65 per cent; bars around 90-95 per cent, while some finishing mills are down to 30 to 50 per cent of capacity. Distribution is spread to meet these uneven schedules; the same situation prevails as to wire rods.

Producers of forging billets are sold through January in many instances and open tonnage of other semifinished for fourth quarter is limited.

In the shift toward Victory ships later some wider plates may be required; mills rolling from slabs can meet the change, but width range limitations are involved in the use of sheet bars.

Warehouse . . .

Warehouse Prices, Page 153

Warehouse steel demand for all products in the Chicago district is heavy, particularly for plates. The extended mill deliveries is now slowing up the flow of steel to warehouses; including plates, sheets and some bar sizes. This restricts distributors' stock turnover to some extent.

Demand for steel from warehouses in the East holds heavy despite some slowing down in buying by machine tool shops and scattered consumers effected by war program changes. Requirements for shipbuilding and aircraft are sustained.

To meet demand most distributors have better balanced stocks, although mill deliveries are lengthening on many products.

Inventories of alloys are in better balance and there is little slackening in bars. Plates are tight with no early improvement indicated. Odd sizes, mill-end material, fairly plentiful last quarter, are now scarce.

Sheet buying is active, hot and cold-rolled, and stock is moved about as promptly as delivered; some sellers are short on cold sheets. A few warehouses are a week or more behind on order deliveries, hampered by manpower shortages; one large jobber in the New York area has leased additional warehouse and outside storage at Jersey City, N. J.

Metallurgical Coke . . .

Coke Prices, Page 151

Soft coal output remains near the 12,000,000-ton weekly rate. Despite every effort the mines seem unable to reach their March level. Coal demand is increasing slightly as many consumers attempt to build up depleted stocks in preparation for the heating season. Flow of coking coal is inadequate to meet the demands. Stocks held by most coal consumers run about 30 days.

Beehive coke oven operations continue unchanged at about 80 per cent of capacity. Most idle ovens are down for repairs, although a few are running below capacity because of inadequate coal supply.

Steel in Europe . . .

London — (*By Radio*) — Demand for special steels and alloys for aircraft work in Great Britain is still expanding. There is a shortage of plates and sheets for shipbuilding yards; pig iron supplies remain adequate.

Canada . . .

Toronto, Ont.—Steel mill representatives report a steady flow of new orders at recent high levels and consequently no reduction in mill backlogs. For most items deliveries are extended to the end of the year. What surplus capacity is available is said to have been taken into consideration by the Steel Controller and is held for emergency demand.

Commitments for last quarter have not attained the high total that featured the market in the last three months of 1942, but despite this condition mill representatives do not anticipate any unfilled capacity.

Production schedules of both pig iron and steel have not yet caught up with the record total made last year, and adverse factors, particularly with regard to labor supply, as well as supply of coke and other raw materials may not permit the big expansion in output as predicted earlier this year. Facing a serious fuel shortage for civilian heating, there is possibility that large quantities of coke that otherwise might have been used in production of pig iron may be taken for house heating purposes. Coke ovens in Canada are being operated at capacity.

Demand for steel plate on ship construction account shows no abatement, with order backlogs extending into 1944. Canadian mills are forced to maintain

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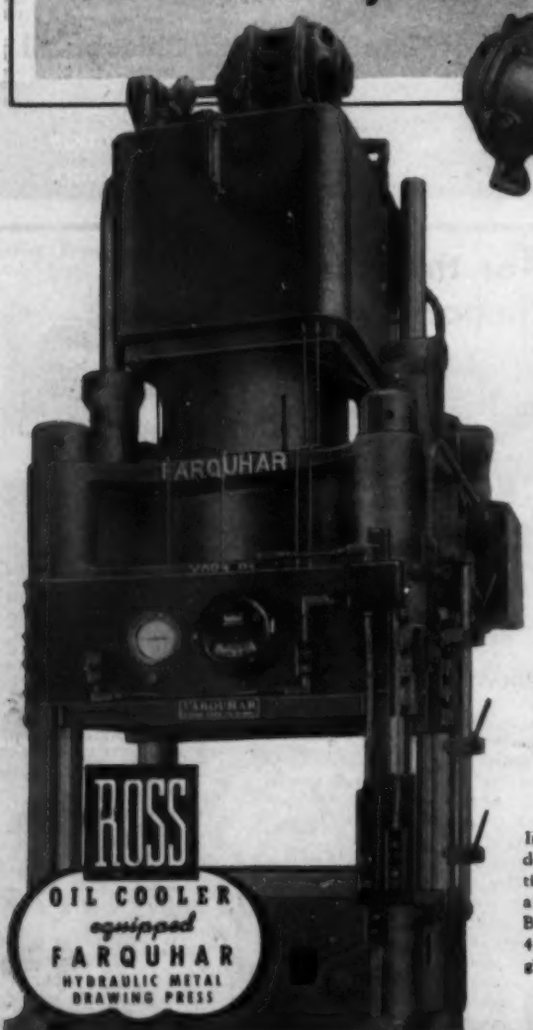

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production well above rated capacity to cope with these requirements. Plate mill at Dominion Steel & Coal Corp., Sydney, will go on a 24-hour basis by the end of the year, in contrast with the present schedule of two eight-hour shifts daily. A sixth furnace for the mill is under construction and when completed a third shift will go to work in the plate mill.

Pig iron output for July totalled 151,369 tons, a slight gain over the previous month's total of 147,889 tons, but a sharp decline from the 172,153 tons produced in July of last year. An increase was recorded in production of ferro-alloys, which amounted to 21,408 tons as compared with 18,151 tons in June and 15,961 tons in July 1942. Production of steel ingots and castings advanced to 250,508 tons from the previous month's total of 239,501 tons, being slightly below the July 1942 figure of 256,560 tons.

In the first seven months of the year pig iron production reached a total of 1,019,158 tons, as against 1,146,153 tons in the same period last year. Ferro-alloys rose slightly from 124,561 tons to 133,201 tons. Output of steel ingots and castings declined from 1,815,798 tons to 1,749,661 tons.

Nonferrous Metals . . .

Nonferrous Prices, Page 153

New York—Allocations of copper for October delivery will be completed this week except for scattered certificates usually late and confined mostly to foundries. While allocations to individual consumers vary with the usable scrap supply, the overall tonnage will about equal that of recent months with the likelihood of some additions to reserves as was the case in September.

Essential war requirements are filled promptly and advancing the date for filing applications for metal has expedited October coverage in some instances. In cases where consumers were reasonably sure tonnage would be allocated, some advance bookings of copper for October delivery were taken by producers. Where allotments are less, the excess will be carried into the following months; producers, however, are reluctant to sell more than one month in advance because of uncertainty as to allotments. Consumers are also conservative as to forward buying. Improvement in shipping conditions is reflected in a steadier arrival of imports.

While some slight relief is felt at copper mines by the release of several thousand troops to raise production, labor shortages are acute at refineries, foundries and mills. The shortage in the brass industry is reflected in the plan for Weirton Steel Co. to roll an estimated 10,000 tons of brass strip a month, a grade used heavily in small arms ammunition.

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11,000 tons, two aluminum extrusion plants, Nebraska and Indiana.

250 tons, building, Federal Telephone & Radio Co., New Jersey; Turner Construction Co., New York, contractor; bids in.

215 tons, building addition, Smith & Wesson, Springfield, Mass.; E. F. Carlson, Inc., Springfield, general contractor.

REINFORCING BARS . . .

REINFORCING STEEL PENDING

850 tons, state hospital, Evansville, Ind.; bids Sept. 8.

125 tons, water reservoir, Great Lakes Naval Training Station, Great Lakes, Ill.; bids Aug. 12.

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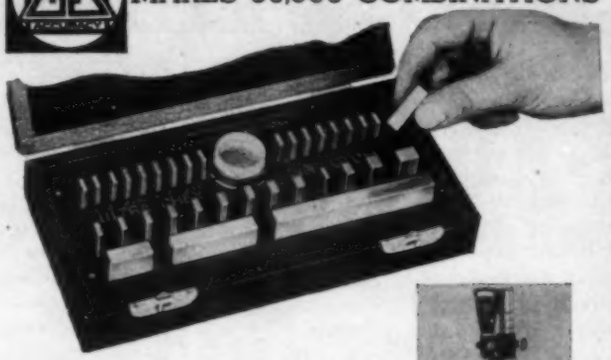

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Industry Holds Postwar Outlook Warrants Renegotiation Changes

(*Concluded from Page 75*)

greater toll. As a result, tool builders, on the average, have been assessed taxes equal to 73 per cent of their 1942 earnings before renegotiation. In contrast, many companies, particularly those in the consumer goods industries whose earnings through 1936-39 were high in relation to their earnings in the war years, are required to pay taxes as low as 55 per cent of their 1942 earnings.

The pamphlet holds that Price Adjustment Boards not only do not give consideration to the effect of taxing, but they use the tax base years 1936-39 as a measure of what a company should regard as normal profit before taxes.

It is pointed out that the Price Adjustment Board's methods of reporting excess profits inevitably convey to the public a false impression as to the profits allowed.

The machine tool builder, it is claimed, appears before a Price Adjustment Board with four critical problems which remain unsolved:

1. Because of his large increase in volume by comparison to the prewar tax-base years, he is subject to an excess profits tax higher than that of many other manufacturers.

2. Now that Defense Plant Corp. business is included under war contracts, the percentage of business which will be construed by the boards as subject to renegotiation will be higher than for a manufacturer in most other industries.

3. He has sold out his market for the next 10 to 15 years—whereas many other manufacturers, especially those in consumer goods fields, are looking forward to an enormous postwar demand for their products.

4. Competition of war built machines in the new machine market already has begun. Machine tools built for the production of war materiel even now are being converted to production of peacetime goods.

To the machine tool builder the situation means that the companies most in need of building up postwar reserves are those who will have the least chance to do so.

Following the first World war, it is pointed out, when taxes were not nearly so heavy as they are today and renegotiation was unknown, many machine tool companies went out of business.

Holding it apparent the remedy should take the form of an amendment to the renegotiation law the machine tool industry suggests the following principles:

1. Renegotiation on the basis of profits before taxes should be abandoned. Agreements should be made wholly in the light of profits after taxes.

2. The extent to which a company's product is expendable in the war effort should be taken into consideration in determining the amount of the company's earnings to be recovered by the government through renegotiation. Due allowance should be made for the peacetime use inherent in the equipment after the nation's war needs have been met.

3. Companies which have saturated their postwar markets by reason of their wartime production should be permitted to retain out of their earnings the reserves necessary to maintain their service to the industries dependent upon machines already installed, to finance the engineering research that leads to new developments, and to finance those new developments through the stages of experiment to production for use.

In conclusion the pamphlet states the responsibility of the machine tool and similar industries to maintain employment and train men must be taken into consideration, as well as the fact that the capacity of the nation to produce machine tools of great accuracy, produce them quickly, and in quantities as needed, is essential to national defense and to a sound national economy.

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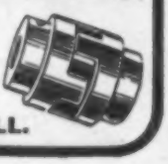

LOVEJOY FLEXIBLE COUPLING CO., 4973 W. Lake St., CHICAGO 44, ILL.

Pacific Northwest Hitches Its Wagon to Bright Industrial Star

(*Concluded from Page 93*)

at Hotel Benson, Portland, pointed out that probably one-third of the population of Oregon and Washington are engaged in war work.

"The Pacific Northwest is producing magnesium, a light metal so young that its future cannot be predicted," he said. "We are producing ferroalloys, calcium carbide, chlorates, metallurgical coke and more zinc, copper, mercury, tungsten, chrome and antimony than ever before. We have one-third of the nation's aluminum capacity. Additions have been made to our forging, casting and machining plants. Steel and aluminum are being rolled. All of these things are new to the district."

He warned that recent new industries are somewhat over-specialized in production of certain semi-raw materials. One of the surest ways to maintain Northwest aluminum plants for postwar operation, he said, is establishment of plants for production of basic alumina needed in the production of aluminum. Such plants can utilize processes developed for the use of certain of the northwest clays, thus saving the expensive freight costs now incurred in shipping alumina from eastern plants to the West Coast.

Coals, clays and silicas of the Northwest have hardly been touched. Hydrogenation of coal for production of internal combustion fuels will grow in importance with the decrease of the petroleum reserves of the nation, Mr. Block said. The Northwest should look to that field.

Stresses Air Transportation

J. C. Rettie, counsellor, National Resources Planning Board, Portland, speaking before the same group of men stressed the importance of air transportation and the part it will play in the postwar period. He directed attention to international air routes which are being considered through Canada, Alaska, Siberia and Russia. The Alaskan air routes, he stated, will be used because the distances are so much shorter. The distance between Chicago and Shanghai is 4300 miles less via Fairbanks than by way of San Francisco, Honolulu, Midway, Wake and Manila.

Stressing the importance of Alaskan trade, Mr. Rettie cited the fact that in the decade 1931-40, our total trade with Alaska was $950,000,000; with China $1,000,000,000.

All up and down the coast industrialists and bankers are giving considerable thought to peacetime production and they express confidence in their ability to meet eastern competition when the time comes to turn out refrigerators, automobiles, airplanes, ships and electrical and household appliances. Their assurance is based upon an ample supply of cheap power, light metals, labor supply both common and skilled, diversified industry, and river, lake and ocean transportation.

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DPC Authorizes Plant Expansion, Equipment

Defense Plant Corp. has authorized the following expansions and equipment purchases (figures are approximate):

Metal-Mold Magnesium Corp., Cedarburg, Wis., for plant facilities in Wisconsin, $170,000.

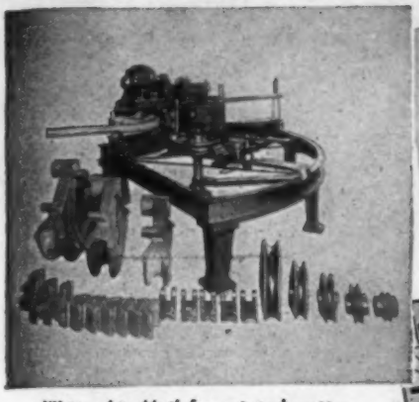
Copper Range Co., Pittsburgh, $90,000 for additional equipment at a plant in Pennsylvania, making over-all commitment of about $375,000.

N. A. Woodworth Co., Ferndale, Mich., $110.000 for additional equipment at a plant in Michigan, resulting in over-all commitment of about $4,250,000.

Humphryes Mfg. Co., Mansfield, O., $230,000 for additional machinery and equipment at a plant in Ohio, resulting in over-all commitment of about $600,000.

Reynolds Metals Co., Louisville, Ky., $365,000 for additional equipment and machinery at plant in Kentucky, resulting in over-all commitment of about $1,215,000.

Iron Fireman Mfg. Co., Portland, Oreg., $70.000 for additional equipment at a plant in Michigan, making an over-all commitment of approximately $600,000.



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CONSTRUCTION AND ENTERPRISE

OHIO

AKRON, O.—Bridgewater Machine Co., 68 Cherry street, granted permission to improve its factory facilities, at cost of about $2200.

CADIZ, O.—Moore Coal Co., John G. Worley, Baker building, this city, agent, has become incorporated with R. W. Moore, F. A. Gibson and H. J. Cofflant, to mine, produce and deal in coal or mineral products of all kinds.

CLEVELAND—National Advisory Committee Aeronautics, Edward R. Sharpe, administrative manager, expects to soon receive government appropriation for research building at Cleveland airport for testing superchargers, to cost about $3,000,000.

CLEVELAND—American Magnesium Corp., 2600 Harvard avenue, office and plant additions, to Sam W. Emerson Co., 1836 Euclid avenue, at cost of about $80,000.

CLEVELAND—Chase Brass & Copper Co., is building two new loading docks, 1155 Babbitt road, at cost of about $20,000.

CLEVELAND—Black Boring & Machine Co., 1400 East 222nd street, is planning expansion of production facilities with an addition to factory.

ELYRIA, O.—Electro Alloys Co., one story factory building, to the Austin Co., 16110 Euclid avenue, at cost of about $40,000.

YOUNGSTOWN—Kinray Mfg. Co., is being formed by Wm. A. Mason, W. C. Hammer and Thos. B. McElray, at 648 Marshall street, for purpose of engaging in general manufacturing business for all kinds of products and machinery.

MASSACHUSETTS

LEOMINSTER, MASS.—R. L. Middlemas, president, Chamber of Commerce, is planning a food storage plant for community use; at cost of about $40,000.

VERMONT

BURLINGTON, VT.—Ordnance division, Bell Aircraft Corp., is moving to Burlington from Buffalo, and will occupy the renovated plant of the Queen City Cotton Co., purchased by the Federal government. Operations will start this month; total employment at peak production will approximate 4000.

PENNSYLVANIA

JENKINTOWN, PA.—Standard Pressed Steel Co., has awarded contract for plant to Townsend, Schroeder & Wood Inc., 1700 Samson street, Philadelphia; at cost of about $150,000.

MICHIGAN

DETROIT—General Broach & Engineering Co., 16139 West McNichols road, has been incorporated to manufacture and sell broaching tools by Earl E. Eklund, 15476 Steel avenue.

DETROIT—Century Steel Corp., Dime building, has been incorporated to deal in iron, steel, copper, and manganese, by David E. Hokin, 6815 South Paxton avenue, Chicago.

ILLINOIS

CHICAGO—Reynolds Metals Co. Inc., Louisville, Ky., has purchased from Southwest Mfg. District Corp., this city, several buildings at Ashland avenue and West Seventy-fourth street, which it will remodel for manufacture of extruded magnesium and aluminum products for aviation industry.

MARYLAND

BALTIMORE—Koppers Co., Pittsburgh, one story brick, steel mechanical laboratory, at Bush and Wicomico streets, to Morrow Bros., 14 East Eager street; at cost of about $45,000.

KENTUCKY

FRANKFORT, KY.—Schenley Distillers Corp., 26 East Sixth street, Cincinnati, has awarded contract for protein recovery plant to Frank Messer & Sons Inc., 2515 Burnett street, Cincinnati, at cost of about $553,000; also power house addition at Lawrenceburg, Ind., to same contractor, at cost of about $225,000.

MISSISSIPPI

GULFPORT, MISS.—Phoenix Naval Store Co., North Gulfport, is planning rebuilding extractor and refinery, destroyed by fire; at cost of about $100,000.

VIRGINIA

WINCHESTER, VA.—City proposes as a postwar project, 10,000 feet of outfall sewer and construction of sewage treatment plant of 2,400,000 gallons average daily capacity.

OKLAHOMA

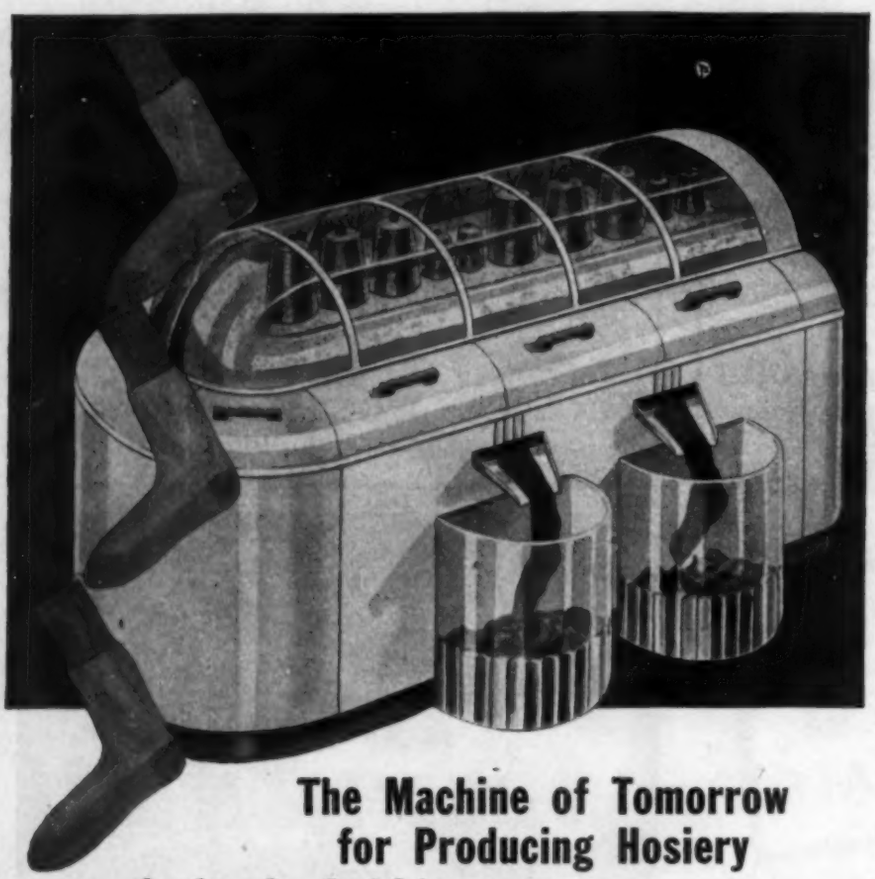
DURANT, OKLA.—Bureau of Yards and Docks, Navy Department, Washington, has awarded contract to Ross Construction Co., San Angelo, Tex., for hangar, etc., costing $226,991; also similar contract to same firm at Conroe, Tex., costing $274,007.

WISCONSIN

PORT WASHINGTON, WIS.—Harnischfeger Corp., lessee, 4400 West National avenue, Milwaukee, is planning altering and repairing building for diesel engine plant; at cost of about $40,000.

TEXAS

DENISON, TEX.—United States Engineer, 231



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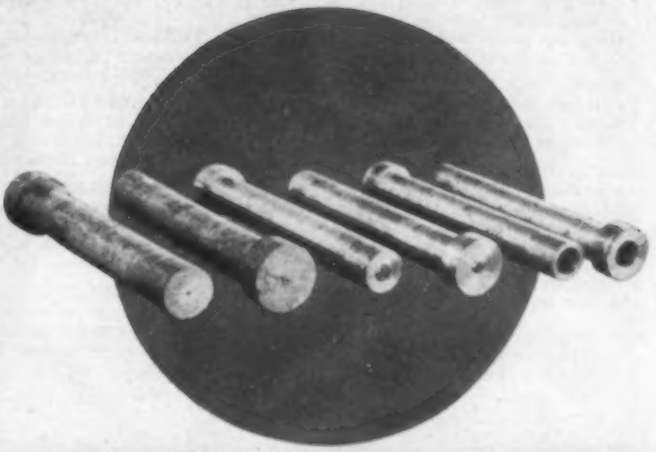

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West Main street, has awarded contract for construction of building for Palo Pinto Co., Dallas, to James I. Barnes Construction Co.; at cost of about $45,000.

CONROE, TEX.—Bids have been received for electrical distribution and water supply system for Clinton United States naval base, to cost about $500,000.

CORPUS CHRISTI, TEX.—Bureau of Yards and Docks, Navy Department, Washington, awarded contract to Broome Electric Supply Co., for electrical work.

HOUSTON, TEX.—Oil Tool Mfg. Co., 1318 Nance street, has awarded contract for plant; to cost about $65,000.

KINGSVILLE FIELD, TEX.—Bureau of Yards and Docks, Navy Department, Washington, let contract for hangar to W. S. Bellows, Corpus Christi.

CALIFORNIA

HUNTINGTON PARK, CALIF.—Pacific Fabricating Co., plans to erect a plant addition at 3383-A Gage avenue, to cost about $3500.

LOS ANGELES—Aero Devices Inc., has been organized in Los Angeles county, and is represented by W. N. Anderson, 444 Thirty-third street, Manhattan Beach, Calif.

LOS ANGELES—B. & K. Modern Machine Shop is the firm name under which Rex V. Berry and Elmer Kuhn have published an intention to conduct business at 350 West Slauson avenue, Los Angeles.

LOS ANGELES—Pico Aircraft Parts Co., is the firm name under which David Goldstein has published an intention to conduct business, at 8570 West Pico boulevard.

LOS ANGELES—Production Tool Products Co., is the firm name under which Paul V. Hildebrand, R. H. Beller, and William Matz have published an intention to conduct business at 815 North Cahuenga boulevard.

SAN PEDRO, CALIF.—The Texas Co., 929 South Broadway, Los Angeles, oil refinery buildings, 2100 East Pacific coast highway, to Foster Wheeler Corp., 714 West Olympia boulevard, Los Angeles; at cost of about $77,400.

WASHINGTON

SEATTLE—United States Engineers, 800 Third avenue, has awarded contract for construction at military installation, King county, to Woodworth & Co. Inc. and MacDonald Building Co., 1517 South Tacoma Way, Tacoma, Wash.; at cost of over $2,000,000.

CANADA

PORT MELLON, B. C.—Sorg Pulp Co. Ltd., plans to start work immediately on plant additions; including erection of seven buildings and installation of equipment, to cost about $85,000.

ST. JAMES, MAN.—Department of Munitions and Supply, Ottawa, R. T. Donald, secretary, has called tenders for construction of cold weather engine test building, and erection of machine shop, No. 5, A.O.S. at Stevenson field, to cost about $50,000 with equipment.

HAMILTON, ONT.—National Steel Car Corp. Ltd., Kenilworth avenue north, Robert S. Hart, vice-president, is receiving bids through Hutton & Souter, architects, for construction of car painting shop and other extensions to cost about $10,000.

KITCHENER, ONT.—Canadian Blower & Forge Co. Ltd., Woodside avenue, A. S. Capwell, manager, has awarded Dunker Construction Co. Ltd., 251 King street west, general contract for plant addition, to cost about $20,000.

KITCHENER, ONT.—Four Wheel Drive Auto Co. Ltd., York street, has given general contract to Dunker Construction Co. Ltd., 251 King street west, for construction of plant addition to cost about $10,000.

LONDON, ONT.—Spramotor Ltd., is receiving bids through L. G. Bridgman, architect, Royal Bank building, for construction of plant addition, to cost about $25,000.

OTTAWA, ONT.—General Supply Co. of Canada Ltd., 356 Sparks street, has awarded C. A. Johansen & Son, 371 Hinton street, general contract for construction of plant, to cost about $20,000.

WESTON, ONT.—Moffat's Ltd., 23 Dennison avenue, will soon let contracts for construction of addition to sheet metal works, to cost about $45,000.

WOOLSTOCK, ONT.—Eureka Foundry & Mfg. Co., 143 Winnett avenue, plans a new plant, to cost about $40,000.

MONTREAL, QUE.—Keating Sons Ltd., 1930 Leber street, Pointe St. Charles, will make plans immediately for the rebuilding of plant for manufacture of marine equipment, to cost about $50,000.

MONTREAL, QUE.—Canadian Vickers Ltd., 5136 Notre Dame street east, has awarded general contract to Anglin-Norcross, Quebec, Ltd., Sherbrooke street west, for construction of prefabricating shop at the Maisonneuve works, to cost about $300,000 with equipment.

MONTREAL, QUE.—Dominion Rubber Co. Ltd., 550 Papineau avenue, plans to start work soon on construction of dry room and installation of equipment, to cost about $20,000.

MONTREAL, QUE.—Electroller Mfg. Co. Ltd., 5849 Boyer street, plans a plant addition to cost about $40,000.

MONTREAL, QUE.—Canadian Car & Foundry Co. Ltd., 621 West Craig street, has awarded a contract for remodeling part of plant to Corinthian Construction Co. Ltd., 5726 Sherbrooke street.

TERREBONNE, QUE.—Mathew Moody & Sons Co., Registered, St. Louis road, farm implements, plans to start work immediately on rebuilding plant recently destroyed by fire, to cost about $100,000.

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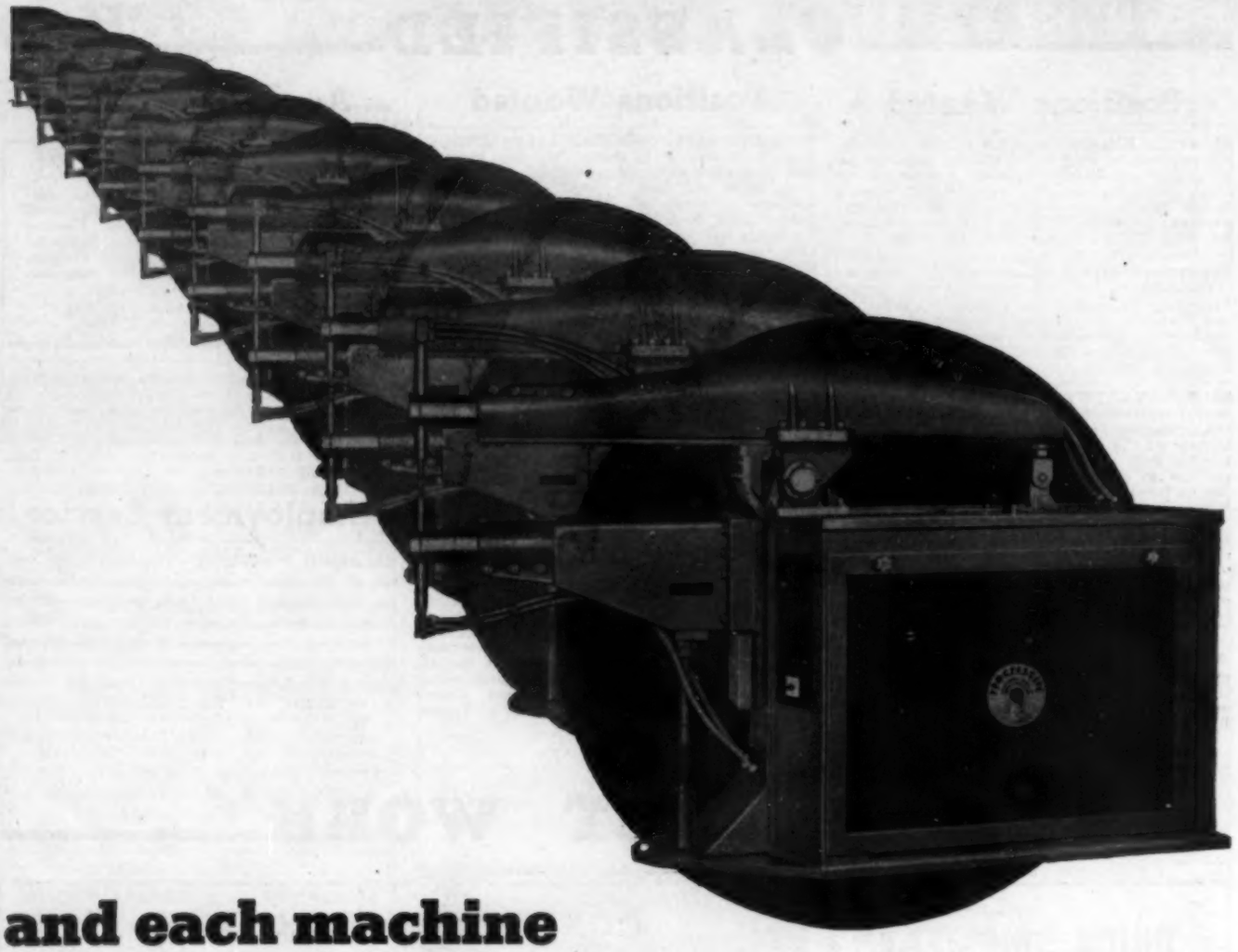

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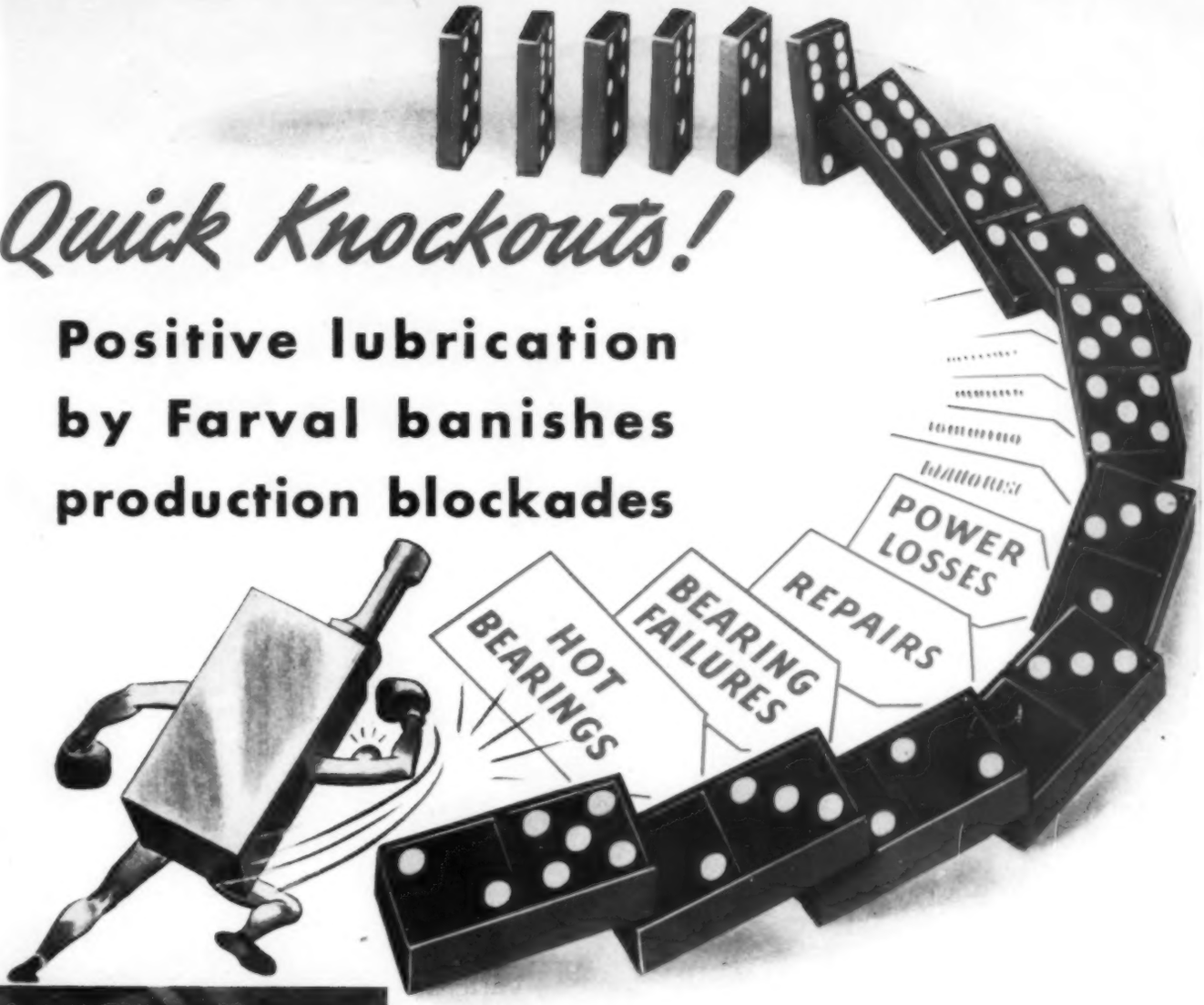

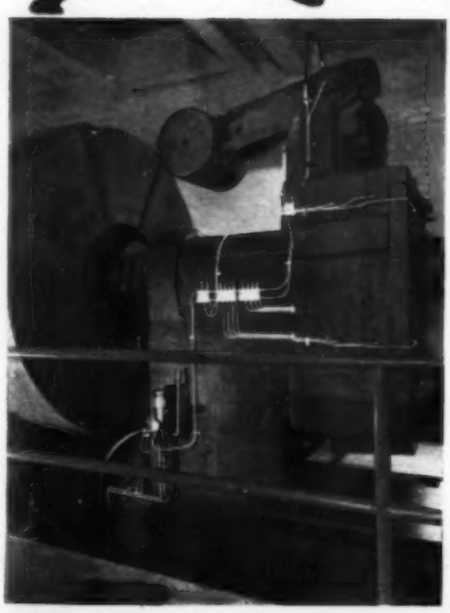

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